PRICE 50 CENTS

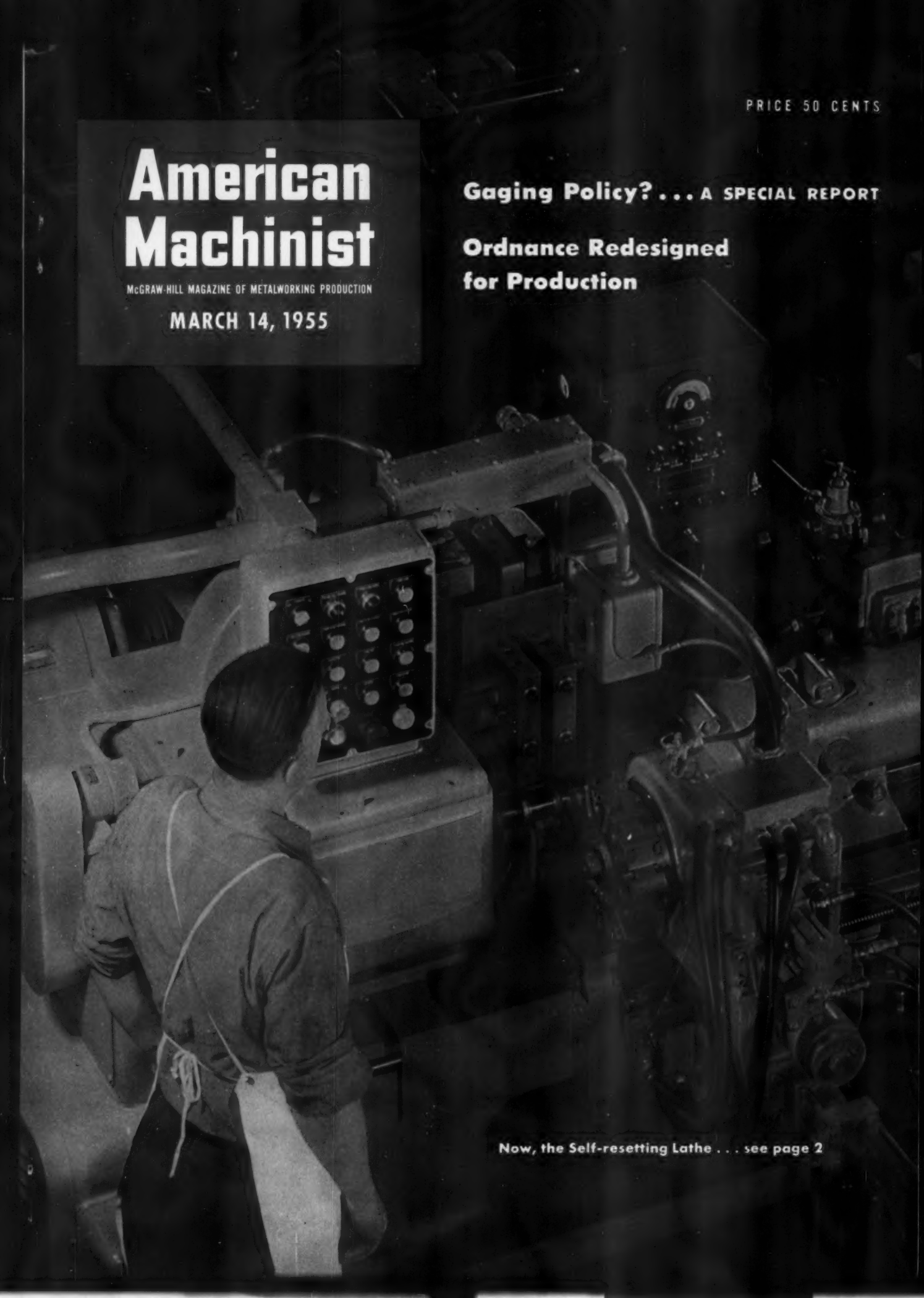
American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

MARCH 14, 1955

Gaging Policy? . . . A SPECIAL REPORT

Ordnance Redesigned for Production

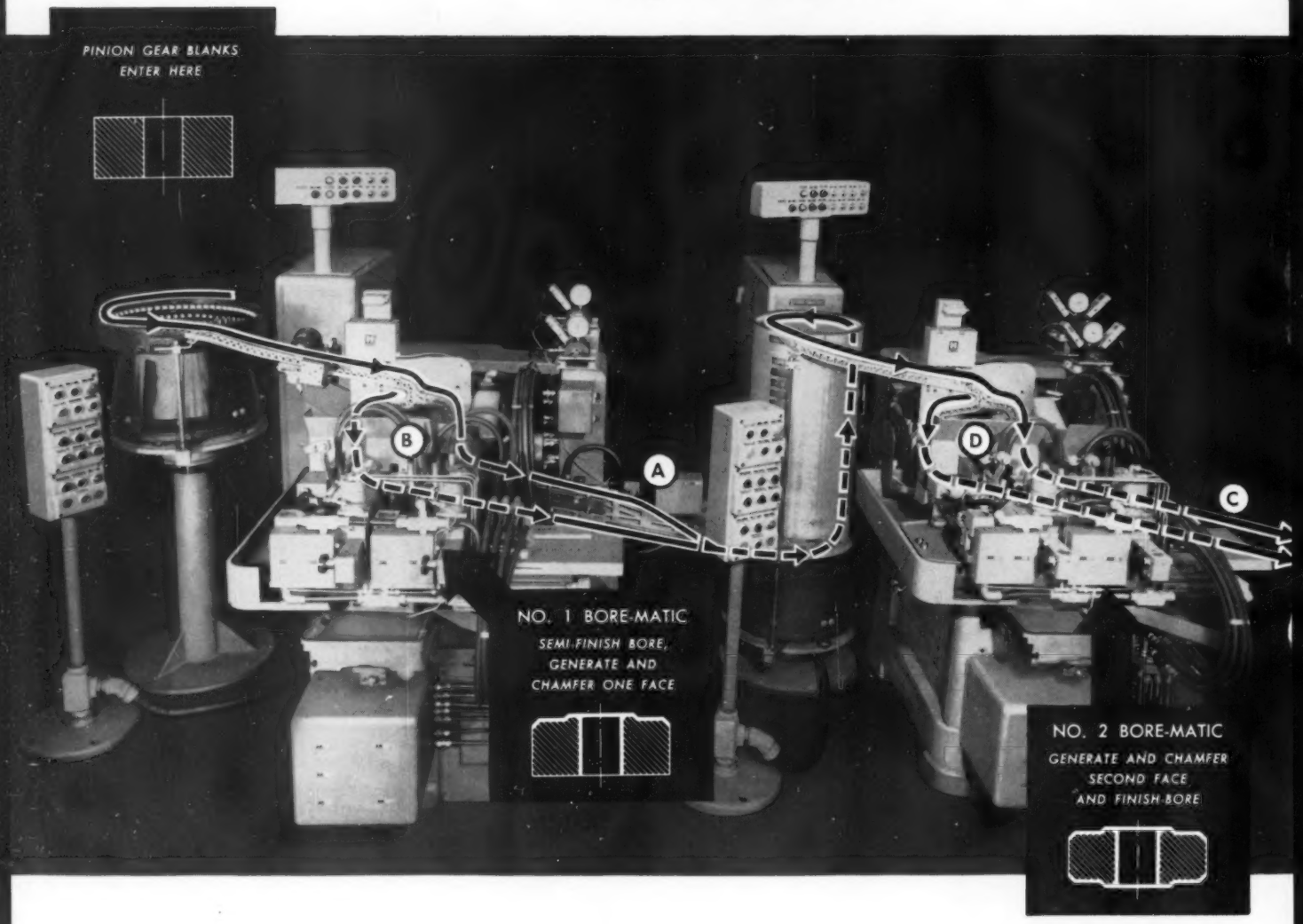


Now, the Self-resetting Lathe . . . see page 2

gear-blank Borizing

COMPLETELY AUTOMATED

by HEALD



THIS HEALD automated Bore-Matic installation performs every operation completely automatically — including work holding, inspection, loading, borizing, ejection, gaging, sorting and tool setting. Here's how it works.

Parts are fed from a vibrating hopper into the loading chute of Bore-Matic No. 1, where they are inspected by a "go-no-go" gage, loaded into chucks and borized two at a time to semi finish the bore and generate and chamfer the outer face. They are then fed to the gaging station at "A" where parts are simultaneously air-gaged for bore size. Gaging data from this point is fed back to the boringheads "B", automatically advancing the tool if bore is undersize or retracting it if bore is oversize. The correctly sized parts then go to the second vibrating loader for No. 2 machine, where they are faced and chamfered on the second side and finish-bored, two at a time. At sorting and gaging station "C" they are again air gaged and boring tools at "D" automatically adjusted to correct for bore size if necessary.

This installation shows how Heald engineering and equipment fit into the modern automated production line. But no matter how much or how little automation you need.... **It pays to come to Heald!**

HEALD®

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

CONTENTS FOR MARCH 14, 1955

Vol 99, No 6

ADMINISTRATION

115 EDITORIAL *Burnham Finney*
152 INDUSTRY ASKS: ARE BLIND MACHINISTS SAFER? *Dr Clifford M Wetcher*
157 PINIC OR CLICQNIC? *Round Table*

SPECIAL REPORT

133 HOW TO SET UP A GAGING POLICY AND PROCEDURE *D G Meckley*

ENGINEERING

126 QUICKER DRAWINGS MEAN QUICKER PARTS *W K Hodson*
167 GEAR TOOTH WEAR AND FAILURE

MATERIAL CUTTING, FORMING

149 SEPARATE SHOES CUT DIE COSTS *Daniel Karpinski*
150 GIANT JOB SHOP
162 SIZING SPRINGS *M Barash*
164 PUNCH AND ARBOR FORM SQUARE STAPLE *Rudolph Schmitt*

TOOLING

117 AUTOMATIC LATHES RESET THEIR OWN TOOLS *Ben C Brosheer*
128 DESIGN FOR PRODUCTION . . . AND HALVE THE COST *Anderson Ashburn*
145 HOW TO MAKE SHELLS WITH RIBS, BOSSES AND PROJECTIONS *Stanley R Cope*
160 SELF-ADJUSTING CUTTER FOR INTERNAL GROOVES *W M Halliday*
160 CENTERS FOR TAPER TURNING *M Barash*
160 WORK DRIVING WITHOUT A DOG *Stanley J Wencek*
161 MICRO-ADJUSTABLE CUTTER BAR FINISHES ID, OD *M W Lalchandani*
161 SETUP TO TURN ECCENTRIC WORK *A A Sinisi*
161 KEYS LOCATE WORK FROM TABLE SLOTS *Richard M Outcalt*
162 RUBBER BUSHINGS AID CONCENTRICITY *Jack Schofield*
163 TAPE KEEPS LAYOUT CLEAN *James Viola*
163 ELECTRODES AVOID PEENING STEP *George Herzl*
163 SLOT FOR INDEXING PLATE LOCATING *Fred Rogers*
164 TAPERED PINS TIGHTEN SHAFT *H J Gerber*
164 MODIFIED FILE IS USEFUL *Jesse M Heath*
164 TOOL TO CUT SQUARE THREADS *E Misener*

CLEANING AND FINISHING

154 ULTRASONICS AND AUTOMATIC HANDLING CLEAN VALVE PARTS
158 ELECTROLESS NICKEL PLATING EVALUATED *Joseph Hass*

INSPECTION AND FINISHING

122 TELESCOPE CUTS INSPECTION TIME *John Sedoric*
124 UNUSUAL WELDING TECHNIQUES BUILD COMPRESSOR ROTOR *R E O'Brien*

NEWS OF METALWORKING

101 SPOT NEWS
103 WASHINGTON
105 DETROIT
107 MACHINE TOOLS
111 GAGING METALWORKING
174 NEWS OF METALWORKING
265 NAMES IN THE NEWS

DEPARTMENTS

94 BACKLASH
159 DIE KINKS
160 PRACTICAL IDEAS
167 REFERENCE BOOK SHEETS
173 TALKING SHOP
184 EQUIPMENT, MATERIALS, PARTS
188a NEWS BULLETINS
204 ROUND TABLE DISCUSSION
251 NEW BOOKS

NUMBER OF COPIES PRINTED THIS ISSUE 37,954

BURNHAM FINNEY editor
E J TANGERMAN executive editor

ANDERSON ASHBURN special projects editor
RUPERT LE GRAND senior associate editor

BEN BROSHEER (Chicago) associate editor
H E LINSLEY associate editor
CHARLES D EMERSON associate editor
WM M STOCKER, JR associate editor
JOHN P WRIGHT associate editor
GEORGE H DE GROAT (Detroit) associate editor

ANN McTAGUE assistant editor
JACK MERRIAM assistant editor
KENNETH KLINE assistant editor

RICHARD E ROOMAN art director
ANNE PALMER assistant
EUGENIA S PATTERSON makeup

ROBERT SHEETS news editor
JAMES C JONES Detroit
ROBERT E COCHRAN Cleveland
MARGARET RALSTON San Francisco
JAMES A LEE Houston
WILLIAM H KEARNS Atlanta
EDWARD W S HULL London
JOHN O COPPOCK Paris
LIONEL J HOLMES Sao Paulo
GERALD W SCHRODER Bonn
DAN KURZMAN Tokyo
JOHN H KEARNEY Mexico City
ALAN ADAMS labor editor
DOUGLAS GREENWALD statistician

DEXTER KEEZER director economics dept.
GEORGE B BRYANT, JR chief Washington bureau
JOHN WILHELM editor world news
FRED H COLVIN editor emeritus

ALBERT HAUPTLI publisher
GEORGE REPPERT, JR advertising sales manager
RUSSELL T DOUGLAS business manager
CATHERINE C KANE manager, reader service

DISTRICT MANAGERS

W D Lanier Rhodes-Haverty Bldg, Atlanta 3
John H Koch 350 Park Square Bldg, Boston 16
Willard J Haring McGraw-Hill Bldg, Chicago 11
P F Pritchard McGraw-Hill Bldg, Chicago 11
Robert Anderson 1110 Delta Ave, Cincinnati 8
Robert Anderson Hanna Bldg, Cleveland 15
Richard H Burke Hanna Bldg, Cleveland 15
James Cash First Natl Bank Bldg, Dallas 1
Wm J Reichard Penobscot Bldg, Detroit 26
H L Keeler 1111 Wilshire Blvd, Los Angeles 17
Gus H Krimsier McGraw-Hill Bldg, New York 36
John F Juraschek McGraw-Hill Bldg, New York 36
John Tiebout Architects' Bldg, Philadelphia 3
P F Pritchard Continental Bldg, St. Louis 8
Richard H Burke 719 Oliver Bldg, Pittsburgh 22
R C Alcorn 68 Post St, San Francisco 4

American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index

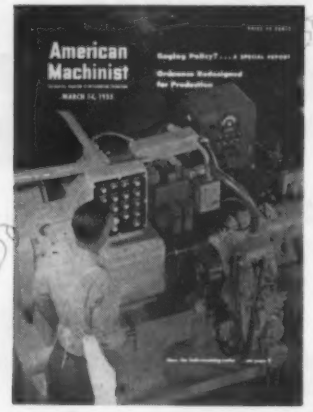
American Machinist, published bi-weekly, with an additional issue in mid-November, by McGraw-Hill Publishing Company, Inc. James H McGraw (1860-1948), Founder.

EXECUTIVE, EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Donald C McGraw, President; Willard Chevalier, Executive Vice President; Joseph A Gerardi, Vice President, Treasurer; John J Cooke, Secretary; Paul Montgomery, Executive Vice President, Publications Division; Ralph B Smith, Vice President and Editorial Director; Nelson Bond, Vice President, Director of Advertising; J E Blackburn Jr, Vice President, Director of Circulation.

SUBSCRIPTIONS: Address correspondence to American Machinist-Subscription Service, 330 West 42nd Street, New York 36, N Y. Allow one month for change of address. Subscriptions are solicited only from production executives and engineers in the metalworking industries. Position and company connection must be indicated on subscription orders.

Single copies, 50c. Subscription Rates—United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada $7 for one year, $11 for two years, $14 for three years. Other Western Hemisphere and the Philippines, $15 for one year, $25 for two years, $30 for three years. All other countries $25 for one year, $40 for two years, $50 for three years. Reentered as second-class matter, November 17, 1953, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

Copyright 1955 by McGraw-Hill Publishing Co. Inc.—All Rights Reserved.



chips

SELF-RESETTING . . . This bids fair to be a year of new wonders in machine tools, and our cover shows the first to be announced. Here is an automatic lathe that gages its product before releasing it, then proceeds to adjust tools to compensate for wear. When wear exceeds a preset limit, the drum in foreground rotates to provide a new tool. Thus the lathe can keep its work—small-motor rotors (shown) and stators—within tolerance during a 5- to 8-hr period. How Sundstrand has achieved this new advance is the subject of our lead article.

GAGING POLICY . . . Inspection, too, is advancing rapidly, both in terms of in-machine gaging as described above, in automatic gaging, and in other phases. Thus we bring you, as our current Special Report, the fundamental thinking, forms, and procedures involved in establishing a workable gaging policy. In this case, policy is a corporate function, involving not only all parts of the company but also its suppliers and their suppliers. Everybody knows the objectives; everybody has the same gages. Object: to avoid scrap. Among program fundamentals: effective inventory control of gages, periodic recalibration by standardized methods, adequate labs, standard for gage design and purchase, and uniform policy. The case study is from York Corp, but *you* can apply it. D G Meckley III (see biog) tells it.

CUTTING DEFENSE COSTS . . . Food Machinery redesigned the M-59 armored personnel carrier for the Army with production in mind. Result: $20,000 saving per vehicle. We picture key operations.

ULTRASONICS . . . To keep you abreast of the latest in ultrasonic cleaning, we have a 3-page article on a new automatic machine at Saginaw Steering Gear. Virgil Sabourin describes this "sound scrubber" that leaves steering-gear parts spotless for assembly.

MANAGEMENT . . . Two subjects are a bit unusual. The first shows how Steel City Electric cut blueprint-studying time for operators as much as 96% by simplifying drawings. The second, by Dr C M Witcher of MIT, shows how to train blind machine operators in 8 weeks. Machine changes are minor, the results very noteworthy.

TOOLING . . . R E O'Brien of Allis-Chalmers describes unusual methods for building up rings of a 1-million-cfm air-compressor rotor for a wind tunnel . . . There's also an interesting spread of pictures from a Denver 3-company job shop that also builds its own equipment in its spare time . . . And John Sedoric of Fairbanks-Morse shows how to use optics instead of a taut wire to check alignment.

PLATING . . . J Haas of Remington-Rand's Lab for Advanced Research discusses the pros and cons of electroless nickel plating. He points out which claims are false for the process, and which are true.

COMING . . . Mar 28 *AM* will have several unusual subjects, beginning with a front cover that shows how to turn radioactive materials, a lead article on a new and simple welding process, and a Special Report on a very fine heat-treating and plating setup. Other articles cover taper honing, barrel finishing, tank production, and die design.

Policy Gager . . . D G Meckley III has his BSIE from Penn State, plus work at Cornell and MIT. He began with York Corporation in 1941, while still at College, was in WW II in the Navy, then returned to York. He was on the works manager's staff, then a plant-layout engineer, asst to the gen supt, asst chief inspector, chief inspector, and since 1952, manager of Quality Control & Inspection, Commercial Div. He has also been an instructor nights at Penn State and active in many local civic groups. He is a member of the A S Quality Control, SAM, York Engrg Society, Tau Beta Pi, and Phi Kappa Phi. He authored our current Special Report.

How to multiply production of straight bevel CONIFLEX® gears and pinions *by as much as 500%*

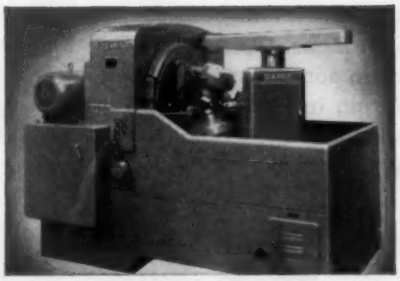
You can do it with the new No. 104 Straight Bevel CONIFLEX Generator.

The two interlocking disc-type cutters, with 24 blades each, *complete a gear in one rapid operation.*

This is the key to the remarkable performance of this new Gleason machine which achieves production rates up to 5 times as fast as any previous generator. In addition, a new generating method insures high efficiency, excellent finish, and maximum cutter life.

The range of capacity, and the ease of setup, make the No. 104 Straight Bevel CONIFLEX Generator ideal for jobbing.

Calculations have been reduced to a minimum and can be done long hand or with slide rule.



The No. 104 Straight Bevel CONIFLEX Generator completes gears up to 8½" diameter and 1⅜" face width, and from 20 to 3 DP.

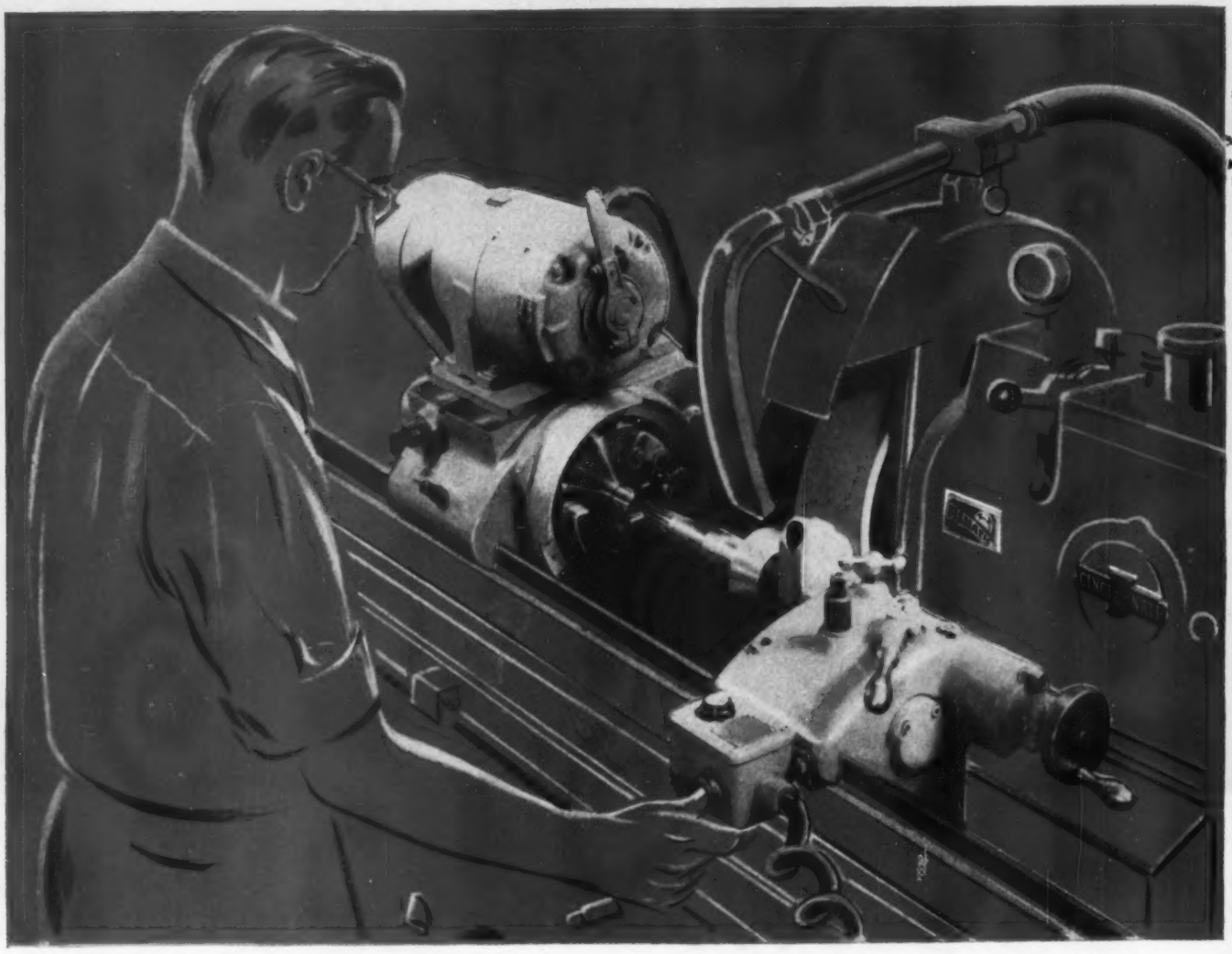
GLEASON WORKS

Builders of bevel gear machinery for over 90 years

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.

We will be glad to send a bulletin giving further details on request.

® Straight bevel gears with localized tooth bearing.



How much time does your shop spend in grinding air? Too much, you can be sure, but it's not the fault of the workmen, for a certain amount of "cutting air" is a necessary evil in many machining operations. ¶Cincinnati Grinding Engineers decided to do something about the time lost in grinding air during automatic infeed grinding cycles and developed the GAP ELIMINATOR feature. Briefly, here's how it works:

> The wheelhead advances toward the work at a rapid rate. At a predetermined point (grinding stock on radius + .001") the rapid rate changes to a fast feed rate. Instantly upon contact of the wheel and work, the normal grinding rate takes over, and the cycle continues to completion.

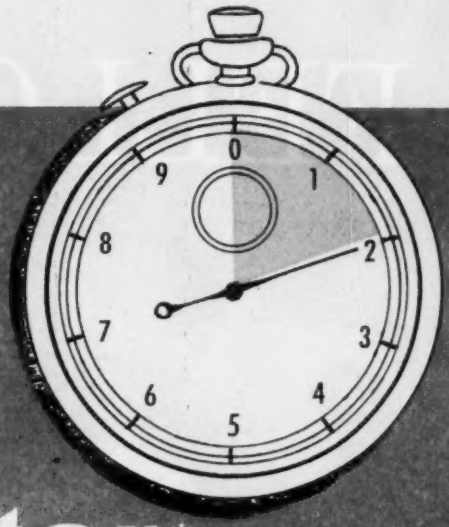
For the example illustrated, the resulting saving amounted to 25.8% of the total cycle time. ¶Time savings like this can mean big dollar savings on the cost records. It will pay the management of every metalworking shop concerned with precision grinding to find out more about the GAP ELIMINATOR feature available for CINCINNATI FILMATIC Grinders. Complete information is contained in folder No. G-648. Write for a copy. Or better still, ask for a visit by one of our field engineers. Chances are he can show you how to save money on your precision grinding operations.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

CINCI NATI **CINCIN**

CENTERTYPE GRINDING MACHINES • CENTERLESS

Conventional Infeed Cycle . . . shaded area indicates time wasted in grinding air.



Gap Eliminator*

Saves 75% of Time Spent in Grinding Air

GAP ELIMINATOR Infeed Cycle . . . shaded area indicates that the time wasted in grinding has been reduced by 75%.

*Patent applied for

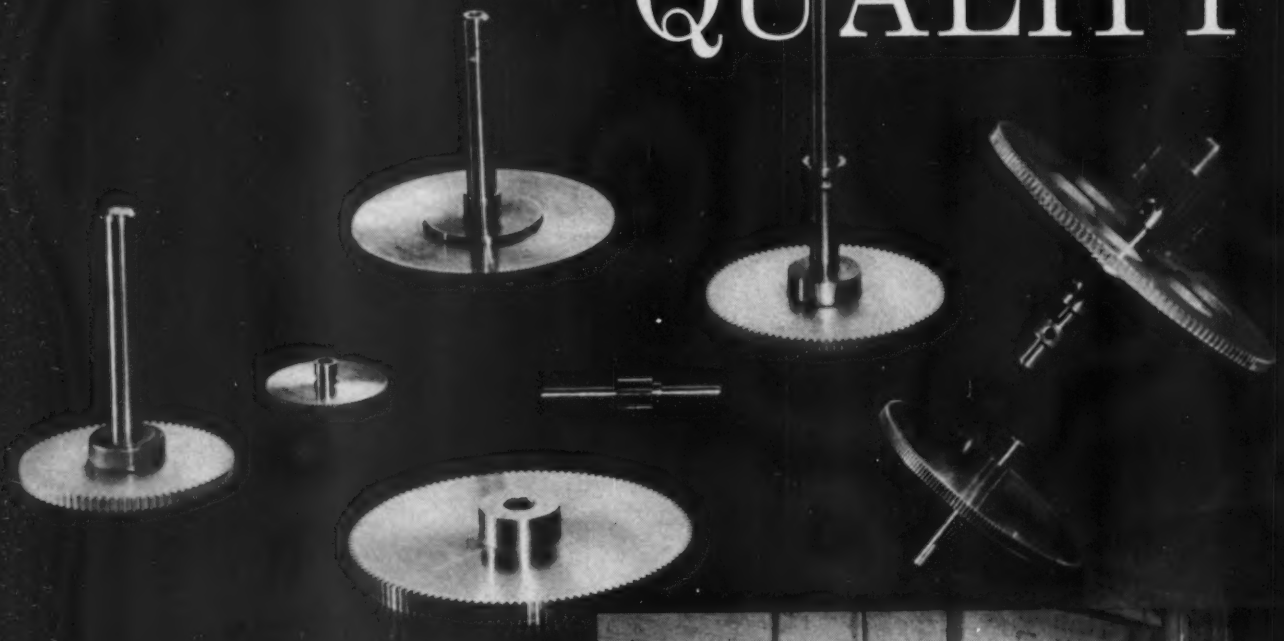
FILMATIC

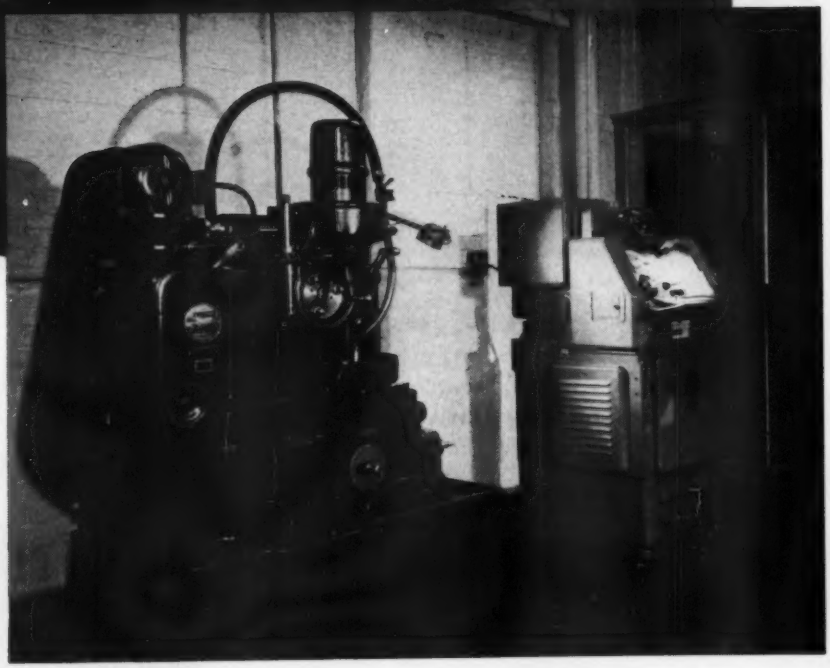
GAP ELIMINATOR, Push-button Automatic Infeed, and other cost-reducing features may be built in CINCINNATI FILMATIC Grinding Machines like the 6" x 30" size illustrated at the right. You can obtain complete information on these precision grinding machines by writing for catalog No. G-566-3.

NATI

GRINDING MACHINES • CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

FELLOWS-CUT QUALITY





THE *Fellows*

. . . *basic* for GEAR TRAINS in ELECTRONIC INSTRUMENTS

Runout tolerances to 'two tenths' are an everyday requirement in a train of gears so perfect that they spin freely at the lightest finger touch.

This unit, with gears from a production lineup of Fellows Gear Shaper, Shaving Machine and "Red Liner" at the Electronic Instrument Division of Ketay Manufacturing Company, New York, is evidence of the results of quality-control at its best.

In spite of the greater accuracy demanded for these sensitive electro-mechanical devices, gear production costs are still of vital importance. The ability of Fellows machines and tools to hold costs under control and to work within the most critical tolerances is being proved every day on the production lines of many industries.

If you have gears to cut, you owe yourself a close look at the cost-control potentials of Fellows equipment. If financing in a series of term-payments is a consideration, THE FELLOWS PLAN is available. The nearest Fellows Office will be glad of an opportunity to send literature or offer personal counsel.

GEAR SHAPER COMPANY

Head Office and Export Department: 78 River Street, Springfield, Vermont.
Branch Offices: 319 Fisher Building, Detroit 2 · 5835 West North Avenue, Chicago 39
6214 West Manchester Avenue, Los Angeles 45 · 2206 Empire State Building, New York 1, N. Y.

Leading Automobile

INCREASES

...with Van Norman

Finish grinding two diameters of rear end pinion. Production increased by 50% with this heavy-duty Van Norman Production Grinder.

VAN NORMAN

MANUFACTURERS OF — Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

Manufacturer

PRODUCTION 50%

Production Grinders

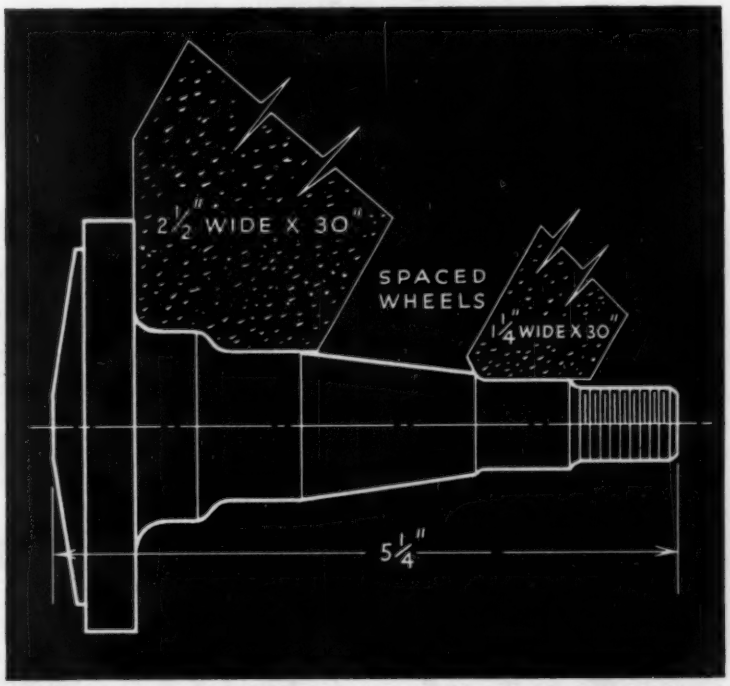
8 TONS OF MASSIVE RIGIDITY

Like all Van Norman Production Grinders this rugged, heavy-duty machine is precision engineered and built to assure maximum grinding accuracy at high production rates.

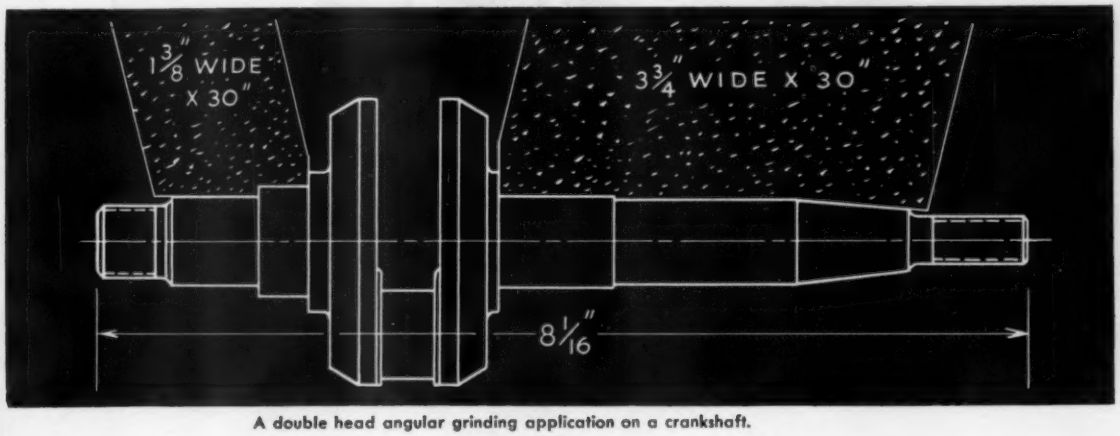
You, too, can boost grinding output, cut costs with Van Norman Special Production Grinding machines. They can be designed with single or double head grinding wheel units. Our engineers will gladly work with you on your particular problems. Write for their assistance.

Don't wait . . . for extra profits install a Van Norman Machine now! They are available on four purchase plans — Outright Sale . . .Purchase on conditional sales contract up to 5 years . . . Straight lease . . . Lease with option to buy. See your dealer or write Van Norman Company.

Lease and Conditional Sales Contracts not available to Export.



A single head angular grinding application on a pinion using two spaced wheels.



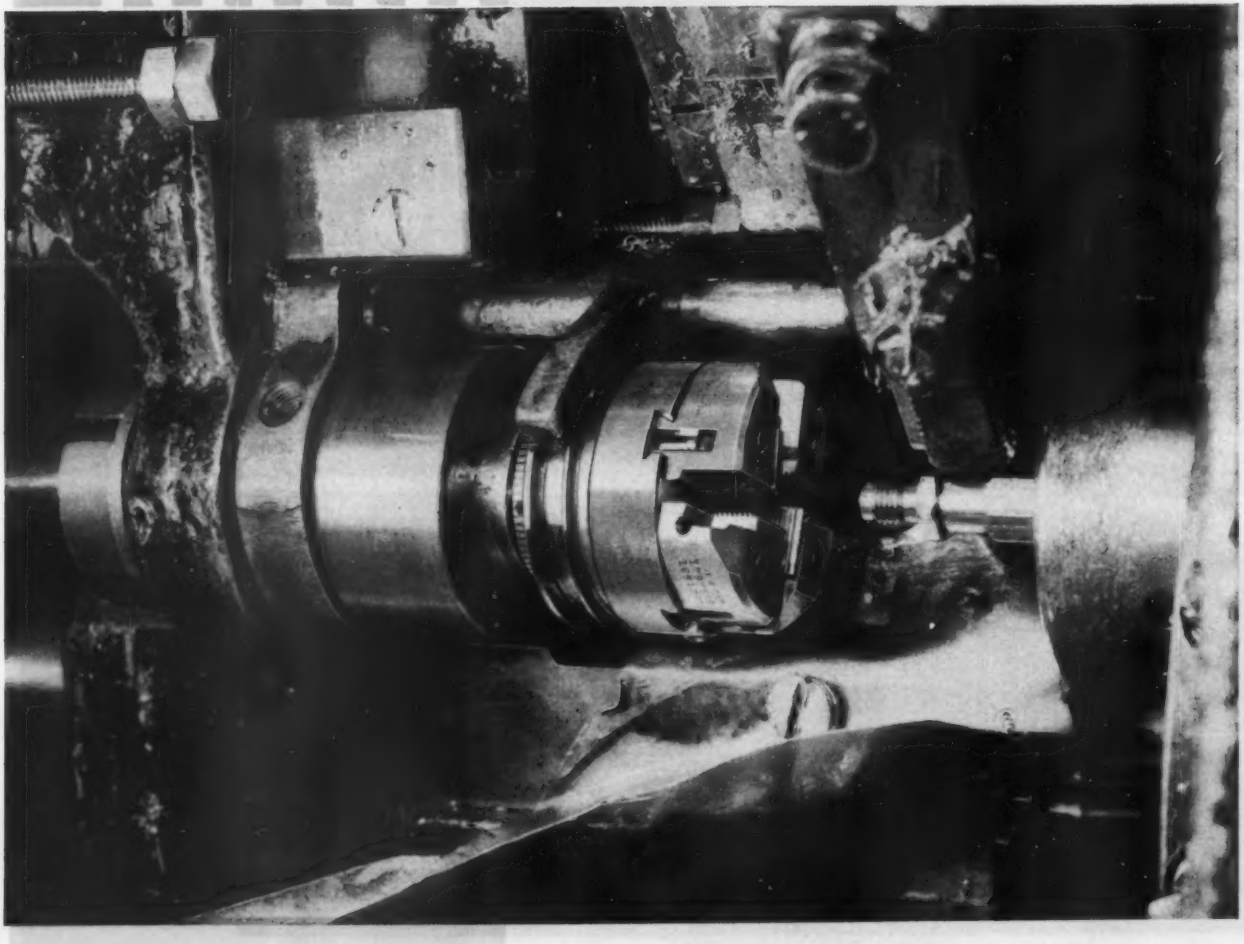
A double head angular grinding application on a crankshaft.

COMPANY

SPRINGFIELD 7, MASSACHUSETTS

LANDIS

Economy Limited Clearance



Threading On Automatics....

To assure economy threading on automatic screw machines where limited die head clearance is a major factor Frank H. Wilson Co., Inc. in Detroit, Michigan use the ½" LL LANDEX Head. Applied to one of their small Acme-Gridley's for threading tubing nuts this head cuts ½", 20 pitch UN threads ⅜" in length on B1113 screw stock to a class three fit. An average of 20,000 pieces are threaded between chaser grinds.

Compactly designed with only a 2 7/16" swing the ½" LANDEX will thread all diameters from #4 to ½". A minimum number of working parts made of hardened and ground alloy steel, chaser holders designed to eliminate warpage and springing, and the use of precision LANDIS Tangent Chasers - - - all contribute to the high degree of rigidity and accuracy of this LANDEX Head.

Compare the chaser lengths in the illustrations and note the long life this LANDIS User has received from the chasers used in this application. These chasers will still produce thousands of threads as (1) LANDIS Tangential Chasers are usable for 80% of their original length; (2) only a few thousandths of metal need be removed from a chaser when regrinding; (3) when regrinding the same amount of metal need not be removed from each chaser; (4) long chaser life is received between grinds. These are the basis for economy in any threading operation.

For further information on this LANDEX Head and on other LANDIS Heads using Tangential Chasers and designed for all types of thread-cutting operations write for Bulletins F-80 and F-90. Please send specifications when writing.

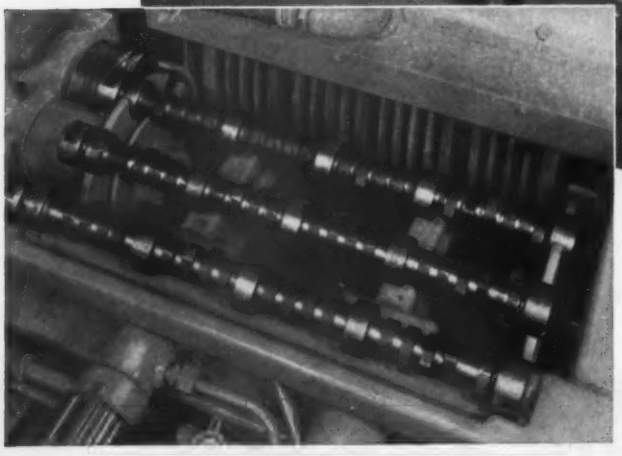
THE WORLD'S LARGEST MANUFACTURERS OF THREAD GENERATING EQUIPMENT

395-C

THE LANDIS *Machine* CO. WAYNESBORO PENNSYLVANIA

Landis automation . . . first in

1935 **Landis automation for camshafts**



Landis automation for camshafts grinds automatically. The year: 1935.

LANDIS

automated

precision grinders

first in automation since 1935

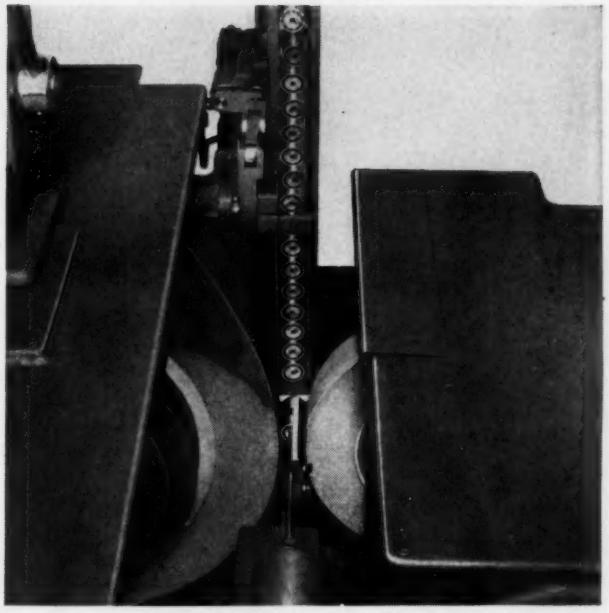
LANDIS TOOL COMPANY

191

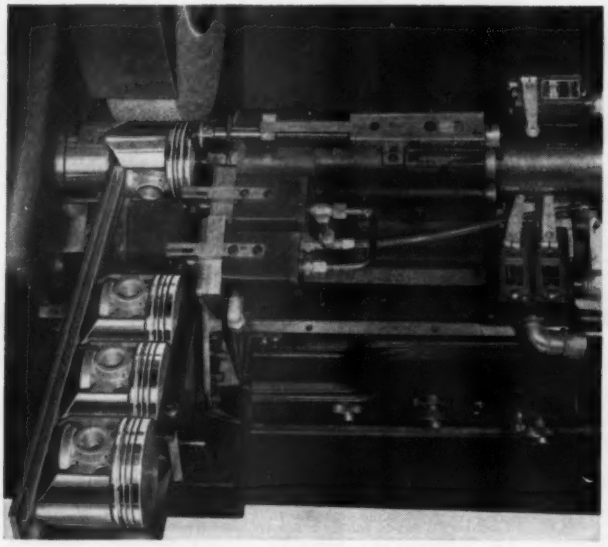
cutting grinding costs automatically

TODAY **Landis automation for a wide variety of work**

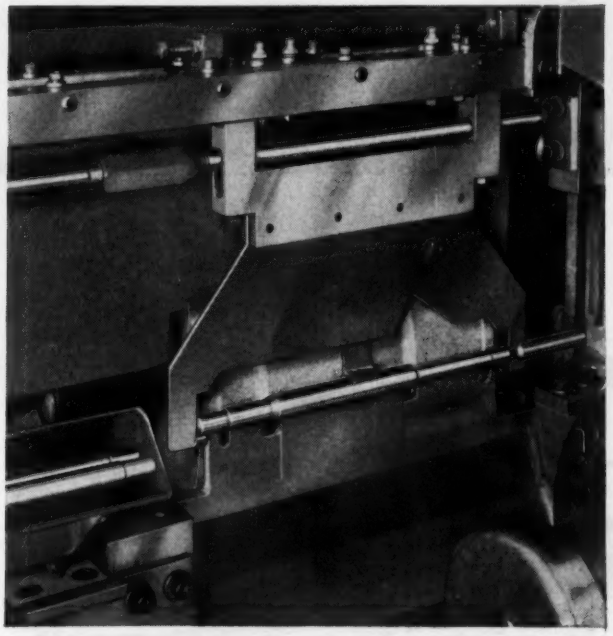
Landis automation for valves



Landis automation for appliance parts



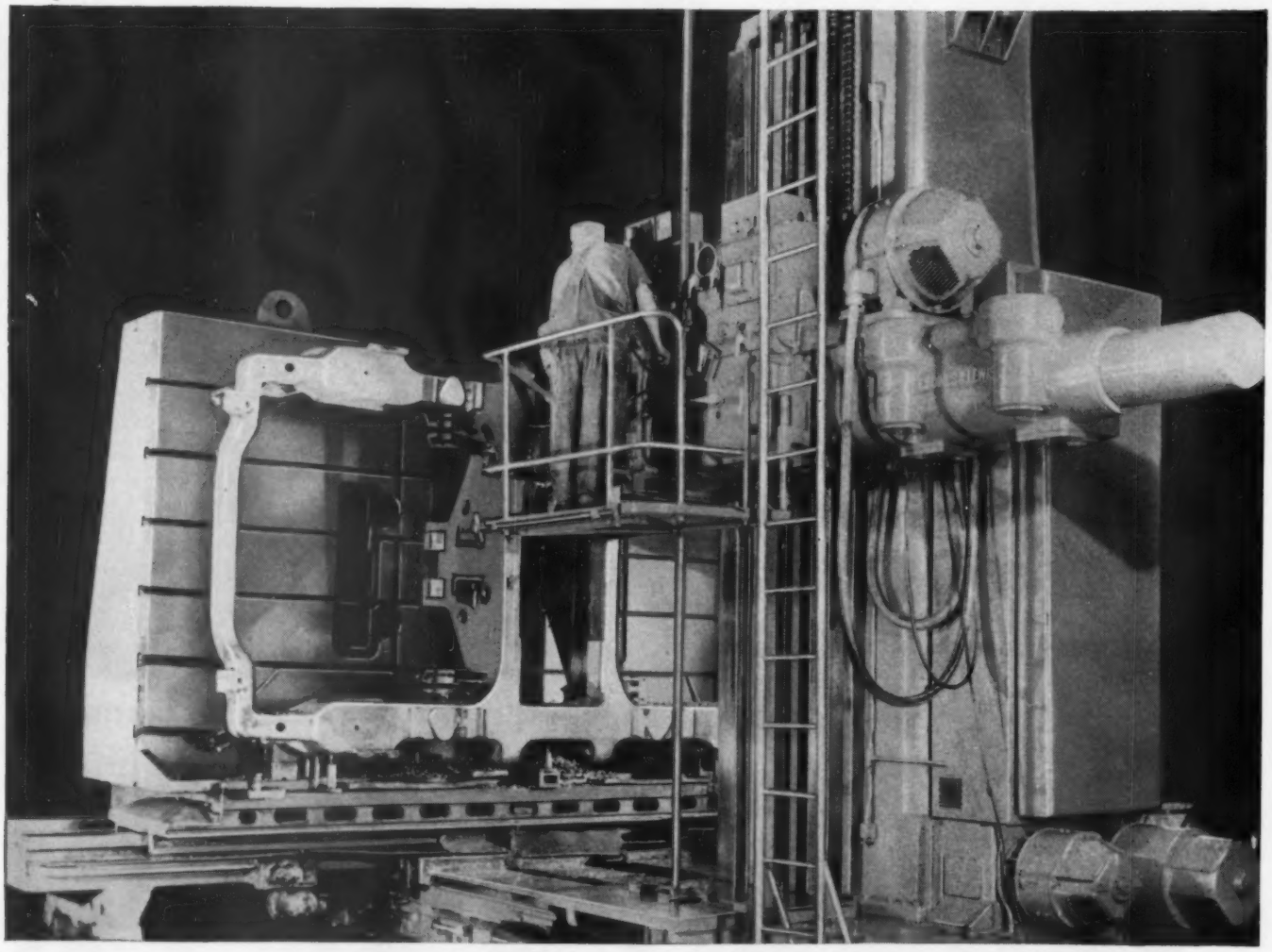
Landis automation for pistons

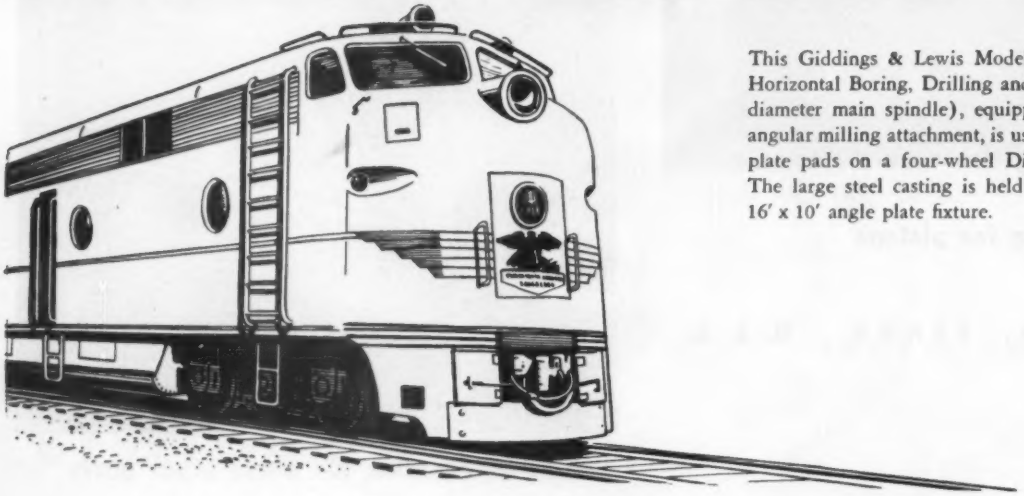


Landis automation for many other parts

WAYNESBORO, PENNA., U. S. A.

How Giddings & Lewis build better trucks for





This Giddings & Lewis Model 570-T (Table-Type) Horizontal Boring, Drilling and Milling machine (7" diameter main spindle), equipped with a heavy-duty angular milling attachment, is used to mill bolster wear plate pads on a four-wheel Diesel locomotive truck. The large steel casting is held exactly in place by a 16′ x 10′ angle plate fixture.

machines help LFM modern locomotives

The Locomotive Finished Material Co. uses Giddings & Lewis 50 Series Horizontal Boring, Drilling and Milling machines and Vertical Boring Mills to turn out precision-machined, high quality iron and steel castings for all types of industry

Widely recognized for quality that pays off on the job — the iron and steel castings made by The Locomotive Finished Material Co., Atchison, Kan. serve in locomotive trucks, gyratory crushers and other products. Giddings & Lewis 50 Series Horizontals (table and floor types), and Vertical boring machines contribute to this precision and quality. Illustrated here are only a few of the many operations — boring, facing, slab milling, turning — which these machines perform in a single set-up.

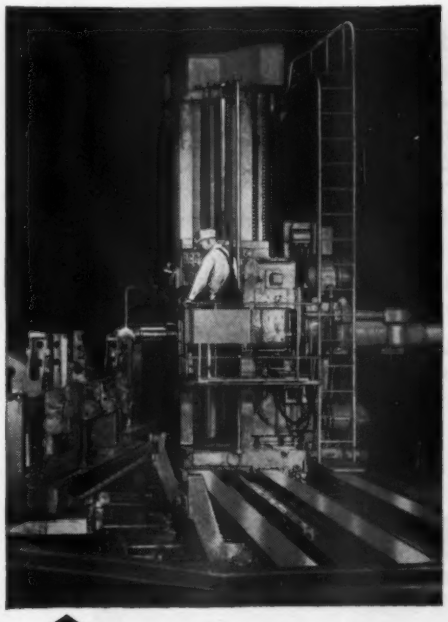
Rugged in design, the G&L's are engineered to cut out elements of non-productive work such as extra set-ups. What's more, they maintain close-tolerances and permit greater flexibility in the choice of feeds and speeds. When equipped with underarm spindle support, angular milling attachments, continuous feed facing head, rotary table or other attachments, these machines enable you to do a variety of intricate operations. Without the above features, many of these operations would require a series of special set-ups and, in many cases, special machinery with different sequence of operations.

If you want to solve high-cost heavy machining problems, there's a G&L machine that can do the job better and at lower cost. For prompt assistance, see your nearest Giddings & Lewis representative, or write direct.

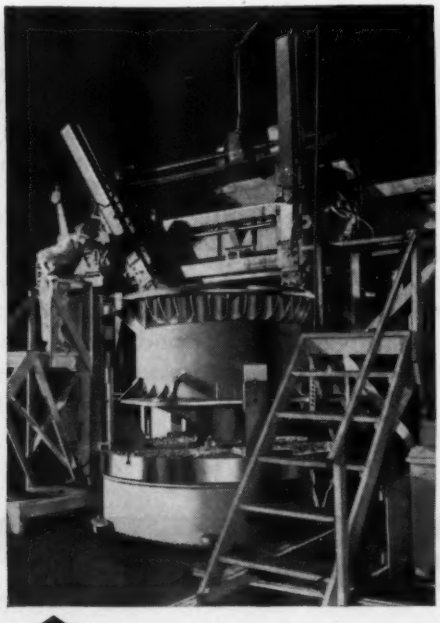
Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Openside Planers, Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools.

GIDDINGS & LEWIS MACHINE TOOL CO.

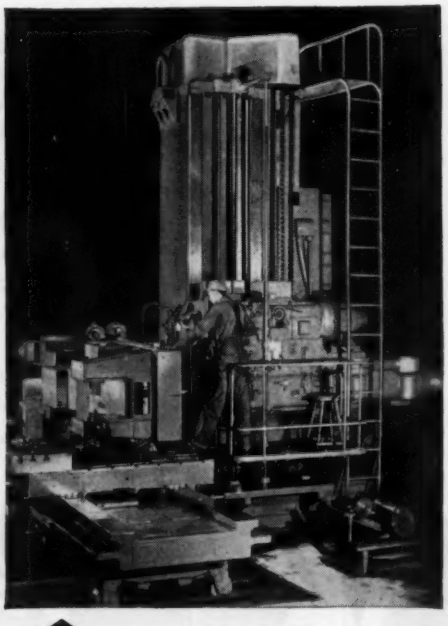
FOND DU LAC, WISCONSIN



This Model 570-F Horizontal Boring, Drilling and Milling machine performs 36 operations in two hours. Inside faces and heel of the pedestals on the Diesel locomotive truck are slab milled. Work is mounted on a large rotary table that moves 12′ at right angles to column runways.



Giddings & Lewis Heavy Vertical Boring mill with 10′ table and 84″ rail clearance is used for a variety of machining operations on large and small castings. Here it's boring an adjusting ring seat on a heavy-duty gyratory crusher housing.



This Model 560-T Horizontal with a 6″ dia. spindle is shown cutting an automatic feed slide on a shell press base. Equipped with a 5′x12′ table with a 12′ travel and headstock with 10′ vertical travel, this is an excellent machine for boring and facing intricate surfaces.

VK PLAIN PLUG GAGES ▾▾ *class XXX !!*

Chromium Plated Steel Gages, Wire Type .010" to 1.010" dia.

Chromium Plated Steel Gages, Taper Lock .010" to 1.510" dia.

Tungsten Carbide Gages, Wire Type .010" to .365" dia.

Chrome Carbide Gages, Taper Lock .365" to 1.510" dia.

Now available for fine inspection requirements

In response to persistent demand, VK has developed and now announces a new, ultra-fine, plain plug gage tolerance of .00001", designated as Class XXX. This new tolerance, half of that of Class XX, satisfies a need, long evident, for gages to meet part limits finer than .0002", and permitting only ten millionths of an inch total variation on the gage in sizes up to .825" diameter, and only fifteen millionths in sizes from .825" to 1.510" diameter. Tolerance may be applied either bilaterally or unilaterally.

Inasmuch as Class XXX tolerance must take into account such factors as finer diameter variation, a high order of roundness control, an exceptional surface finish and an extreme resistance to wear (all of which offset the shallow wear depth inherent in such a gage class), Class XXX is offered in only Chromium Plated and Carbide Gages.

VK Class XXX Plain Plug Gages are furnished in the materials, styles and ranges shown in boxed panel above. VK also furnishes Class XX, X, Y, and Z standard tolerance plug gages in wire type, taper lock and trilock designs. For complete information address: The Van Keuren Company, 173 Waltham St., Watertown, Mass.

"Quality in Millionths"

VK

36th YEAR

THE *Van Keuren* CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires

Multiple spindle automatic builders do not deny the importance of good frame design. As early as 1920 Cone's revolutionary frame was substantial evidence that Cone did something about it.

For some time there has been discussion concerning the relative merits of the use of 100% carbide tooling on multiple spindle bar automatics. There has been very little information made available about successful carbide application to this type of machine by its builders or by carbide suppliers. But Cone is doing something about it.

The Conomatic Carbide Development program is accumulating much helpful information for "automatic" users through test runs under production conditions. The illustration is an example of such information applied to an actual production run. Full data is available.

Action speaks better

MATERIAL—ALUMINUM: Hole drilled with 1" and 1 1/16" dia. drills to 1½" depth, and tapped to ¾" depth.

	HSS	CARBIDE
Cycle Time	90 secs.	**11 secs.**
Work Spindle Speed	270 R.P.M. at 104 S.F.	**830 R.P.M. at 320 S.F.**
Tool Wear	5,000 pcs. per grind	**20,000 pcs. per grind**

Conomatic}

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

Why you get top savings with

The "CROWN JEWELS"

No one disputes the fact that diamond wheels save time and money in carbide tool grinding. The big question is: *which* diamond wheels save the *most?*

There's a very logical answer. Buying diamond wheels calls for the same trust in the supplier — in his reputation for full value and expert craftsmanship — as buying diamond jewelry. And right there is where Norton's long leadership in diamond wheel development and manufacture is the best possible safeguard for your investment. In fact, only Norton offers you such long diamond wheel experience to help you produce more at lower cost.

For your further guidance, check these reasons why Norton diamond wheels are the recognized "Crown Jewels" of the entire field:

Norton was first to introduce the three major diamond wheel bond types — resinoid, metal and vitrified — and has always pioneered in their advancement.

The sizing, grading and laboratory checking of diamonds used in Norton diamond wheels is done in Norton's own plant — never anywhere else.

Norton duplicates specifications for each wheel type and size with utmost accuracy for uniform top performance.

The line of Norton diamond wheels is complete, with sizes and types covering not only every carbide grinding application but every other field — stone, glass, ceramics, electronics, etc. — where diamond wheels are used.

Norton diamond wheels for every need are quickly available from full stocks in Worcester, five strategically located warehouses and Distributor's stocks.

See your Norton distributor

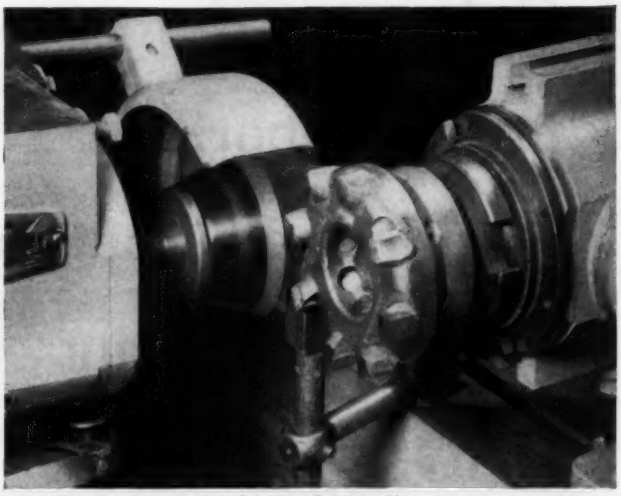
for further facts on Norton diamond wheel performance and applications. Ask him for the 142-page illustrated booklet, *Grinding Carbide Tools,* and the complete net priced Diamond Wheel Catalog. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Inc., Worcester 6, Mass.

Norton Diamond Wheels...

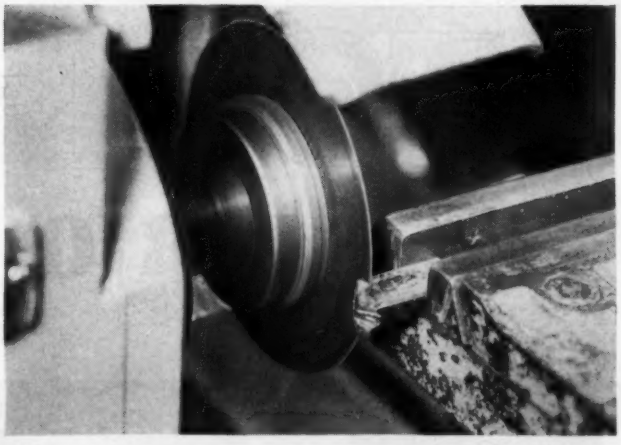
for carbide grinding

For Top Savings In Production Grinding of single point carbide tools, use Norton vitrified bonded diamond wheels. Combining fast cutting action with high resistance to grooving, they're often preferred for grinding chip breakers and for precision grinding (cylindrical, surface and internal) of carbide tools, cutters, thread gages, rolls, etc. This Norton engineered bond holds each diamond particle for maximum useful cutting action and long, money-saving wheel life.

For Top Savings On Especially Severe Single Point Tool Grinding and where long life is most important, Norton metal bond diamond wheels are recommended. They're also most economical for many other jobs — such as cutting-off sintered carbide blanks, glass, ceramics, germanium and stone.



For Top Savings In Multi-Tooth Grinding, Norton resinoid bonded diamond wheels hold size completely around cutter after cutter, assuring uniform height to each individual cutter tooth. Their extra fast cutting action and long service life are big advantages in precision sharpening. Two bond types available — regular, for maximum economy in wet grinding and B6, for best results in dry applications.



Making better products... to make your products better

W-1610

NORTON

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

YOU PAY NO MORE THAN

for this new Model C Autometric precision boring machine when put to work in your plant with...

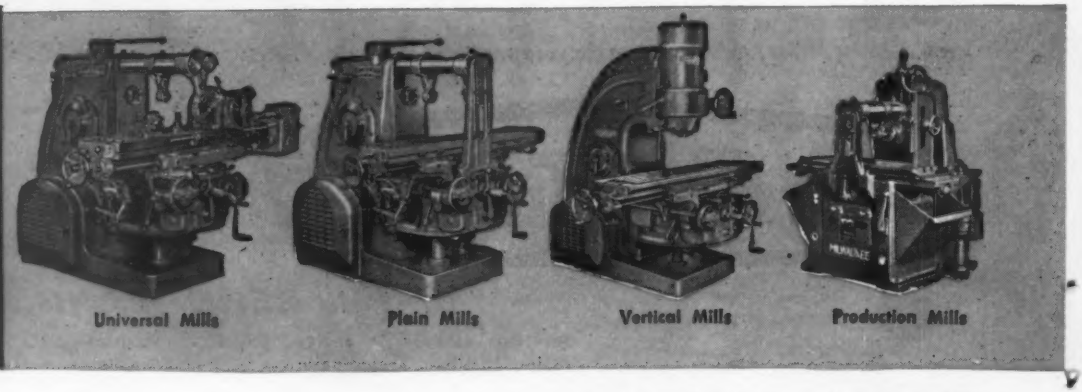
For additional data on this machine, see our catalog in Sweet's.

Kearney & Trecker's

TOOL-LEASE

PROGRAM

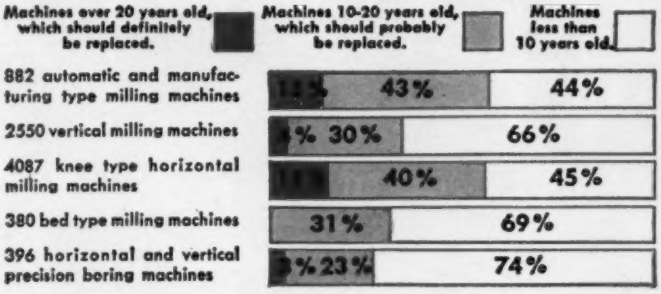
Kearney & Trecker manufactures a complete line of more than 250 standard knee and bed type milling machines and precision boring machines.



59 CENTS PER HOUR...

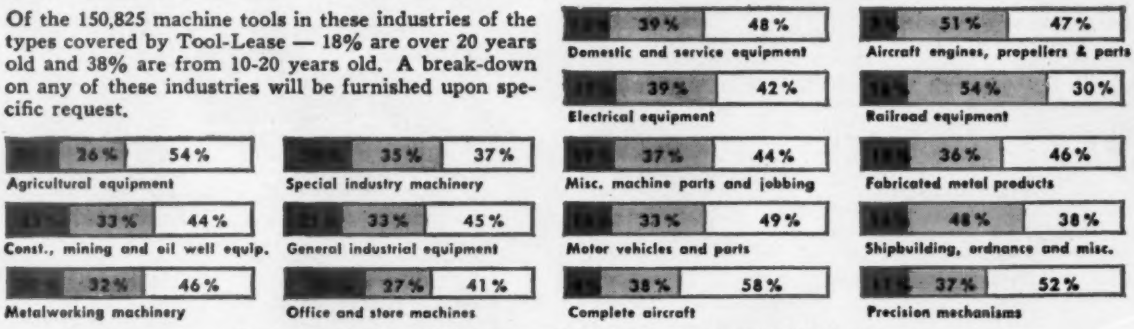
LET'S LOOK AT THE OBSOLESCENCE PICTURE IN THE INDUSTRY OF PRECISION MECHANISMS

Includes machines for laboratory, scientific and engineering instruments; mechanical measuring, controlling instruments; optical; surgical; medical, dental instruments and equipment; photographic equipment; watches, clocks, clockwork devices, and parts. Of the total 8,295 machines, 10% are over 20 years old, over 36% are 10 to 20 years old.



HERE'S THE OVERALL PICTURE IN THE ABOVE AND 15 OTHER BASIC INDUSTRIES

Of the 150,825 machine tools in these industries of the types covered by Tool-Lease — 18% are over 20 years old and 38% are from 10-20 years old. A break-down on any of these industries will be furnished upon specific request.



Figures adapted from 1953 American Machinist survey of metalworking industry

THINK of it! You can lease this new Model C Autometric boring machine for as little as 59 cents per hour! It's an exceptionally low price to pay for this modern, high precision-built boring machine, designed specifically for performing the most exacting operations in your toolroom, laboratory or shop.

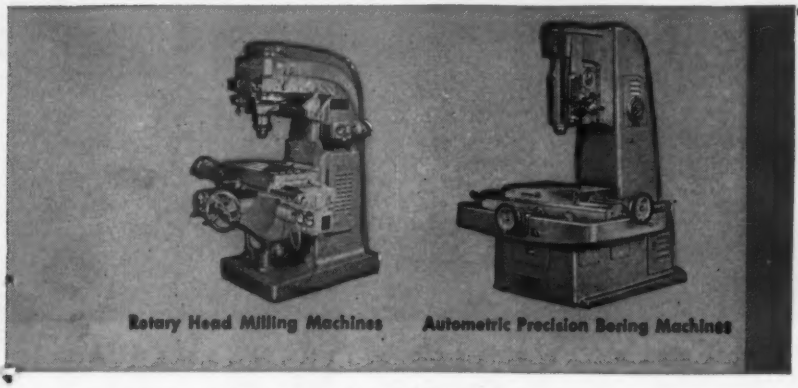
Under Plan "A," one of three possible lease agreements, you make two semi-annual payments, totaling 25% of the machine's price during each of the first three years. And only 10% during each of the last four years. What's more, this lease agreement permits you to terminate or purchase your Model C Autometric at the end of the third year or at the end of any year thereafter.

Under Kearney & Trecker's Tool-Lease program you can rent any of over 250 different types and sizes of standard milling machines or precision boring machines. All are available under three basic plans, with varying options to continue or terminate the lease, or to purchase the equipment. If you require special machinery or heavy-duty CSM bed types, special agreements will be considered.

For complete information on Tool-Lease, see your Kearney & Trecker representative or mail coupon to Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

TOOL LEASE
KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS
EQUIPMENT
®

©1954



Rotary Head Milling Machines

Autometric Precision Boring Machines

KEARNEY & TRECKER CORP.
6784 W. National Ave., Milwaukee 14, Wis.

Please send me Bulletin TL-10A on Tool-Lease Program and booklet titled "Critical Picture of Creeping Obsolescence."

Name.....

Title.....

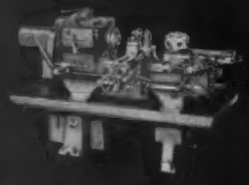
Company.....

Address.....

City.....Zone.....State.....

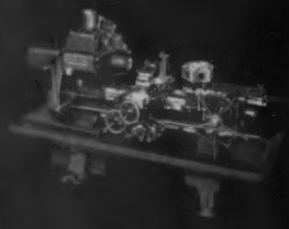
RAM TYPE TURRET LATHES

NO. 2 ALL-GEARED HEAD
1" Bar Capacity
14" Swing



NO. 3 UNIVERSAL
1½" Bar Capacity
15⅜" Swing

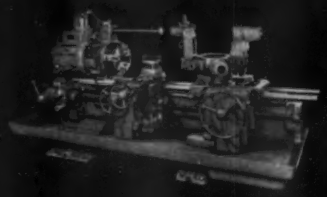
NO. 4 UNIVERSAL
2" Bar Capacity
18⅛" Swing



NO. 5 UNIVERSAL
2½" Bar Capacity
20" Swing

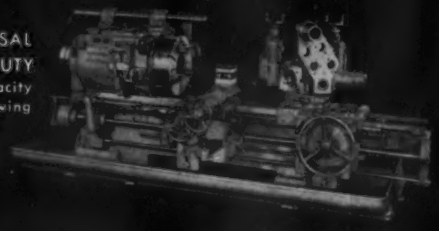
SADDLE TYPE TURRET LATHES

1-A UNIVERSAL
HEAVY DUTY
2⅛" or 3" Bar Capacity
16¼" Swing



2-A UNIVERSAL
HEAVY DUTY
3½" Bar Capacity
20" Swing

3-A UNIVERSAL
HEAVY DUTY
4½" or 6" Bar Capacity
23½" Swing



4-A UNIVERSAL
HEAVY DUTY
8" 9" or 12" Bar Capacity
28¼" Swing

PRECISION TAPPING AND THREADING MACHINES

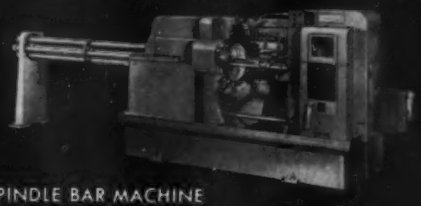
NO. 10
TAPPING MACHINE
0-80 to 10-24 Capacity

NO. 11
TAPPING MACHINE
8-36 to ⅞" Capacity

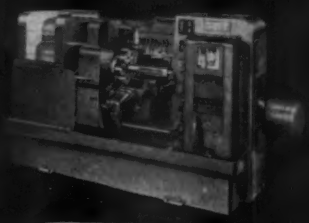
NO. 11 RS RADIAL (Single Head)
NO. 11 RD RADIAL (Double Head)
8-36 to ⅞" Capacity

NO. 12
TAPPING MACHINE
⅜" to 2½" Capacity

MULTI-SPINDLE AUTOMATICS



6-SPINDLE BAR MACHINE
¾" or 1¼" Bar Capacity



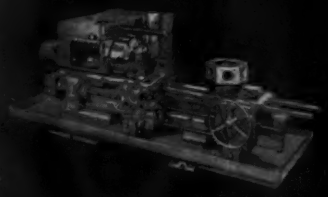
5-SPINDLE
CHUCKING MACHINE
6" Swing

5-SPINDLE BAR MACHINE
1¾" Standard Bar Capacity
2¼" Oversize Capacity

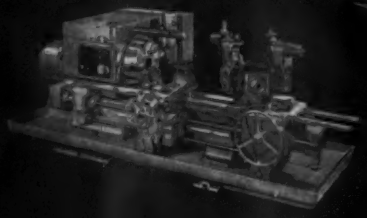
YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER &

SADDLE TYPE TURRET LATHES

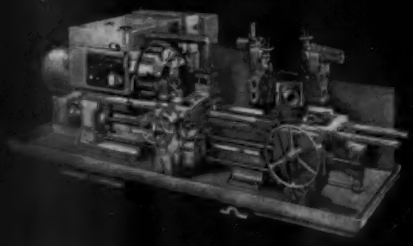
1-A UNIVERSAL
EXTRA-HEAVY DUTY
2½" or 3" Bar Capacity
16¼" Swing



2-A UNIVERSAL
EXTRA-HEAVY DUTY
3½" or 4½" Bar Capacity
20" Swing

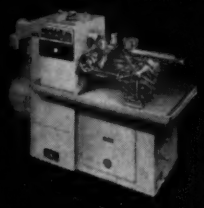


3-A UNIVERSAL
EXTRA-HEAVY DUTY
4½" or 6" Bar Capacity
23½" Swing



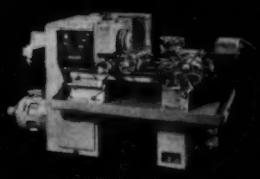
4-A UNIVERSAL
EXTRA-HEAVY DUTY
9" or 12" Bar Capacity
28¼" Swing

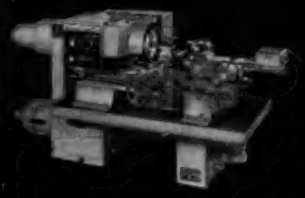
ELECTRO-CYCLES



NO. 1 ELECTRO-CYCLE
5/8" Bar Capacity
11" Swing

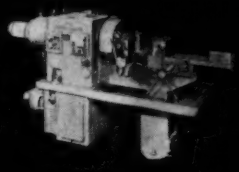
NO. 2 ELECTRO-CYCLE
1" Bar Capacity
14" Swing



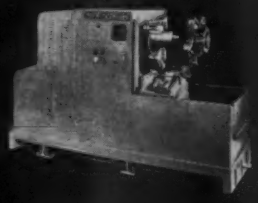


NO. 3 ELECTRO-CYCLE
1½" Bar Capacity
15⅜" Swing

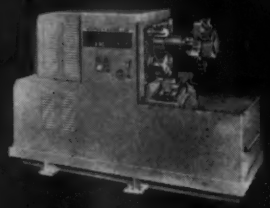
16" ELECTRO-CYCLE
1½" Bar Capacity
16⅞" Swing



SINGLE SPINDLE AUTOMATICS



1 AC CHUCKING MACHINE
8" or 10" Chuck — 6" Working Stroke



2 AC CHUCKING MACHINE
10" or 12" Chuck — 9" Working Stroke

When the going gets tough ...put it on a WARNER & SWASEY

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

His
"6th Sense"
is mostly
good
business sense
MORSE
Franchised
Distributor

. . . another good reason why it pays to depend on your

MORSE - FRANCHISED DISTRIBUTOR

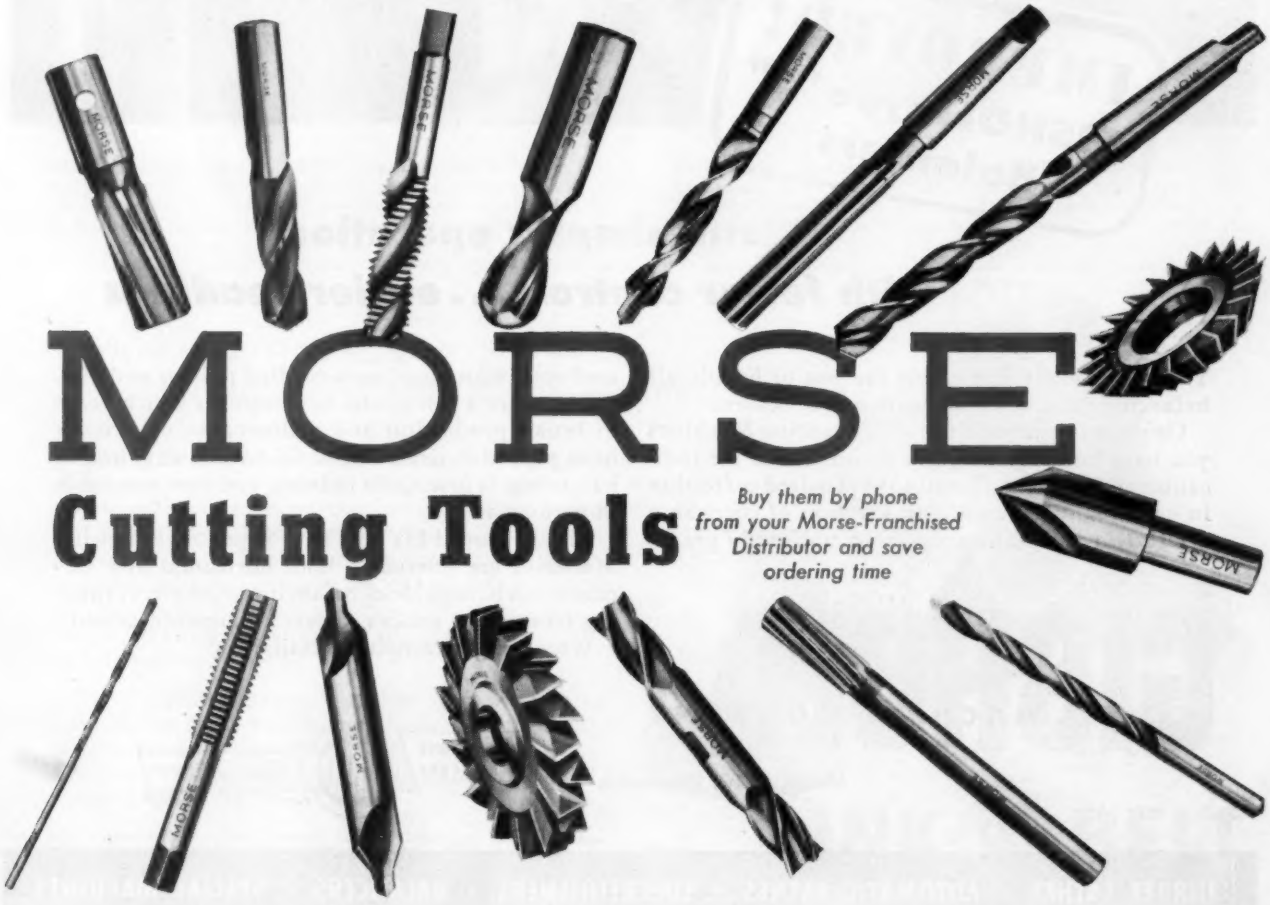
It's his good business sense that helps your Morse-Franchised Distributor to anticipate your wants — and keeps him constantly on the alert for those products you might need.

This foresightedness is an invaluable protection for you in your supply problems . . . just as the Morse Line is top protection for your cutting-tool dollar. On any job, Morse can give you the most for your money . . . and your Morse-Franchised Distributor is always right on deck to see that you get it. So for drills, taps, dies, reamers, end mills and cutters . . . plain or Electrolized . . . *depend* on your Morse-Franchised Distributor.

MORSE TWIST DRILL & MACHINE COMPANY

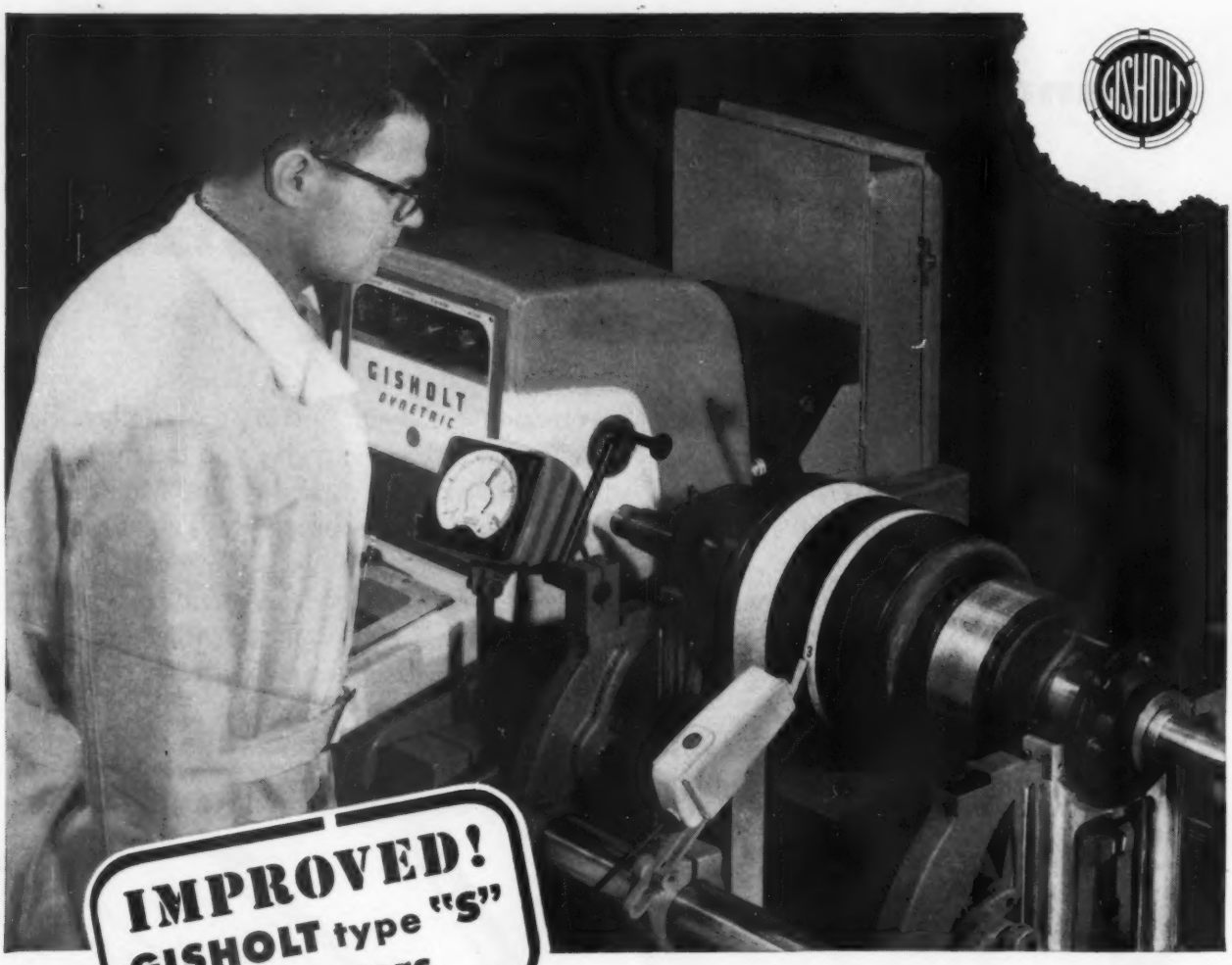
(Division of VAN NORMAN COMPANY)

NEW BEDFORD, MASS. · *Warehouses in* New York, Detroit, Chicago, Dallas, San Francisco



MORSE Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time



IMPROVED! GISHOLT type "S" Balancers

still simpler operation
with fewer controls . . . easier readings

Yes, we've made it possible for you to handle all balancing faster and easier than ever before.

On these improved Type "S" Balancing Machines you have but two operating controls, one for indication of amount and location of required correction in each plane. Amount and location of correction are shown simultaneously—on a uniformly graduated scale with large, easy-reading pointer and dial.

These are a few of the new features which years of broad production and maintenance experience have proved desirable. And Gisholt, always first in balancing, is first again to bring you new standards of performance.

The improved DYNETRIC Type "S" Balancing Machines are offered in both horizontal and vertical models, capable of balancing workpieces ranging from a few ounces to several hundred pounds.

Why not get complete details?

GISHOLT MACHINE COMPANY

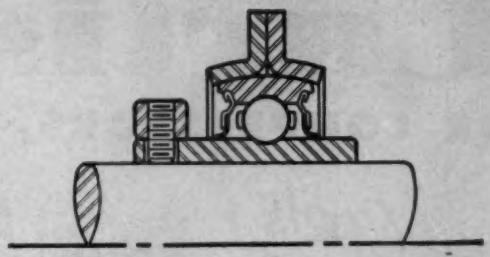
Madison 10, Wisconsin

DYNETRIC BALANCERS GISHOLT

DEVELOPED JOINTLY WITH WESTINGHOUSE ELECTRIC CORPORATION "DYNETRIC" IS A TRADE MARK REG. U. S. PAT. OFFICE BY WESTINGHOUSE ELECTRIC CORPORATION

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

LOW COST is achieved with the use of an especially sturdy, pressed steel housing that combines strength and light weight, yet equipped with the same high quality precision bearing used in all Link-Belt ball bearing blocks.

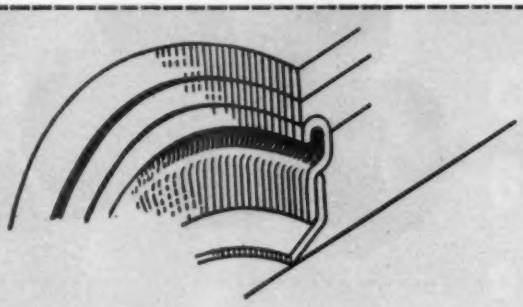


UNRESTRICTED SELF-ALIGNMENT. Aligning surface of housing is precision-coined to assure proper fit and support of bearing. Free-rolling action and full load capacity are maintained even with shaft misalignment.

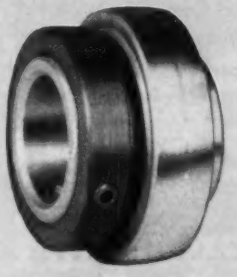
It's important

bearing differences

like these that add up to strength plus economy



MAXIMUM SEALING EFFICIENCY. Synthetic rubber lip-type seal, integral with the bearing, retains lubricant and excludes dirt . . . even in extremely dusty conditions. Greased at factory, bearing needs no further lubrication.



SINGLE-ROW, DEEP GROOVE BALL BEARING assures smooth operation and long life. Manufactured in accordance with the standards for the Anti-Friction Bearing Manufacturers Association BCO2 ball bearings.

They're all present only in this new, low-cost LINK-BELT ball bearing

HERE'S the kind of specialization you get in industry's most complete line of ball and roller bearing blocks. The wide-spread need for a low-cost bearing—offering precision, anti-friction bearing performance—led to development of the JPS-200. Bulk is minimized—unrestricted alignment and effective sealing characteristic of Link-Belt bearings are maintained. The result is a bearing that costs you less . . . yet can challenge any for efficiency in light-duty applications.

Every Link-Belt bearing is made to meet just such a specific need. Ask your Link-Belt office or authorized stock carrying distributor for Folder 2517 on the JPS series. Get Book 2550 for data on Link-Belt's complete line.

Low-cost series JPS-200 is part of industry's most complete line of ball and roller bearing blocks.

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

13,713-A

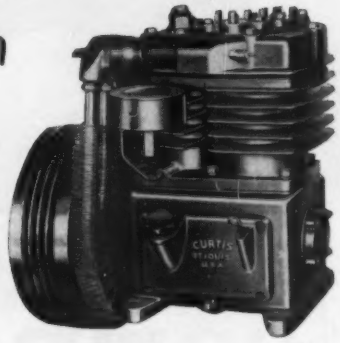
LINK-BELT

Ball and Roller Bearings

Curtis

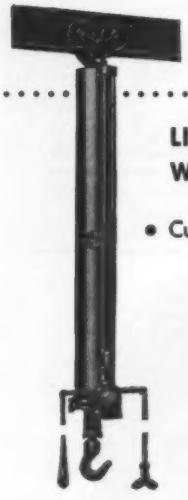
AIR COMPRESSORS, HOISTS and CYLINDERS

Cut Costs While Speeding Production



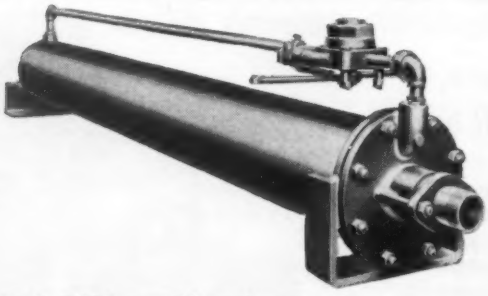
AIR TO DO INNUMERABLE JOBS AT LOWER COST WITH A PRECISION-BUILT CURTIS COMPRESSOR

- Timken roller main bearings equipped—easy external adjustment.
- Self-oiling—pressure lubricated rod bearings and piston pins.
- Air-cooled—no danger of freeze-ups.
- Tank Mounted Compressors ¼ H.P. through 15 H.P. (up to 78 cu. ft. displacement per minute)
  Simple Compressors ¼ H.P. through 50 H.P. (up to 300 cu. ft. displacement per minute).



LIFT OR LOWER LOADS QUICKLY WITH A CURTIS "ALL STEEL" AIR HOIST

- Cut costs with these time-saving, work-saving air-powered hoists.



PUSH IT, PULL IT, LIFT IT, LOWER IT WITH A CURTIS "ALL STEEL" AIR CYLINDER

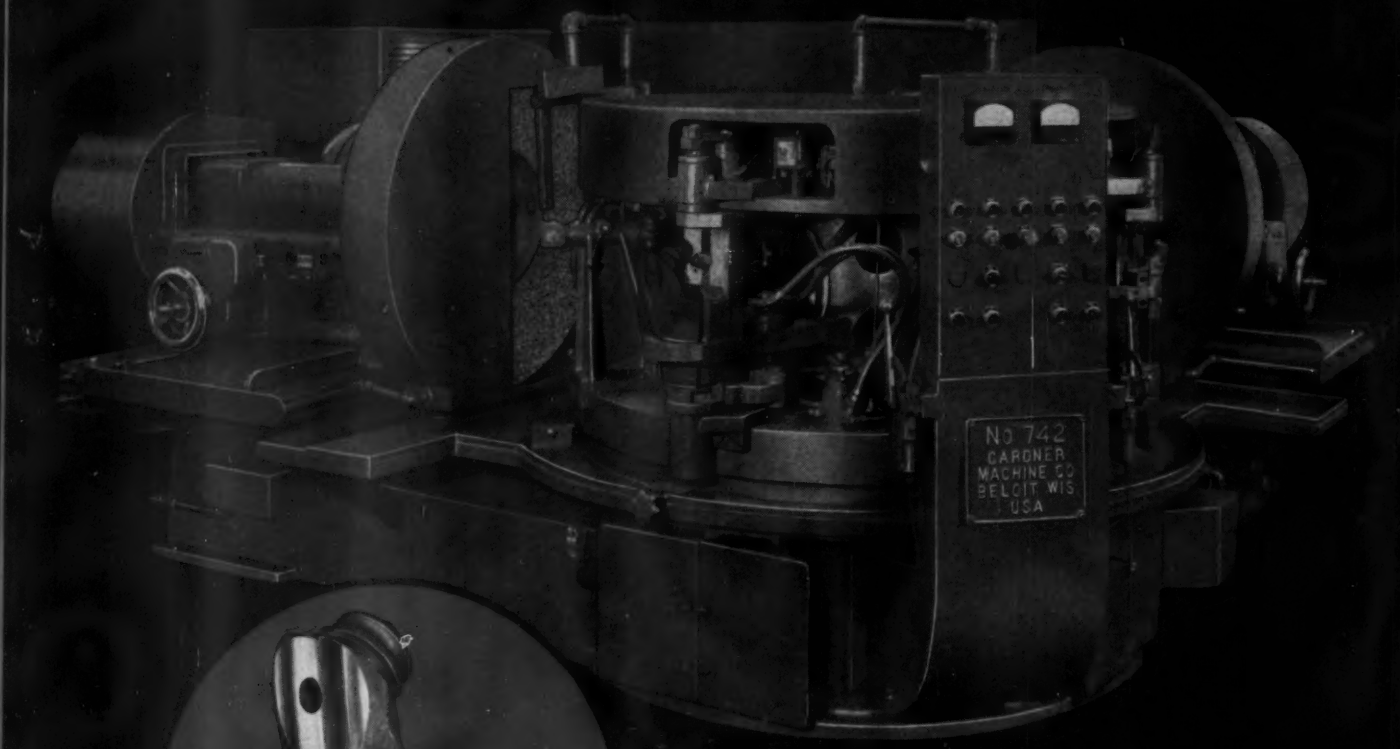
- Curtis Bracketed Air Cylinders can work in any position from horizontal to vertical.
- Delicate control of lifting and lowering speeds.
- Cylinders ground and polished on inside diameter.
- They bring new time-saving ease where lifting, lowering, pulling or pushing is required.
- Valve is disc type. Returns automatically to neutral position when operating chains are released . . . and effectively hold the load.

Get all the facts about cost-cutting Curtis equipment!

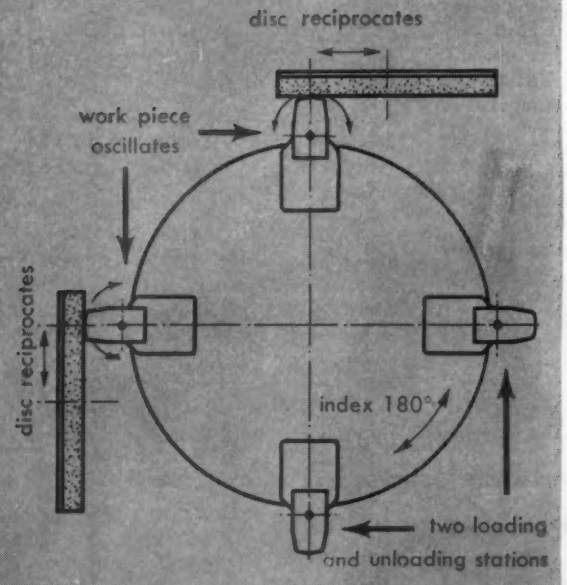
1854 **101** 1955 years

Curtis PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1924 Kienlen Avenue • St. Louis 20, Mo.

-806



Gardner Disc Grinder Generates Curved Surface on Rough Forgings



142M

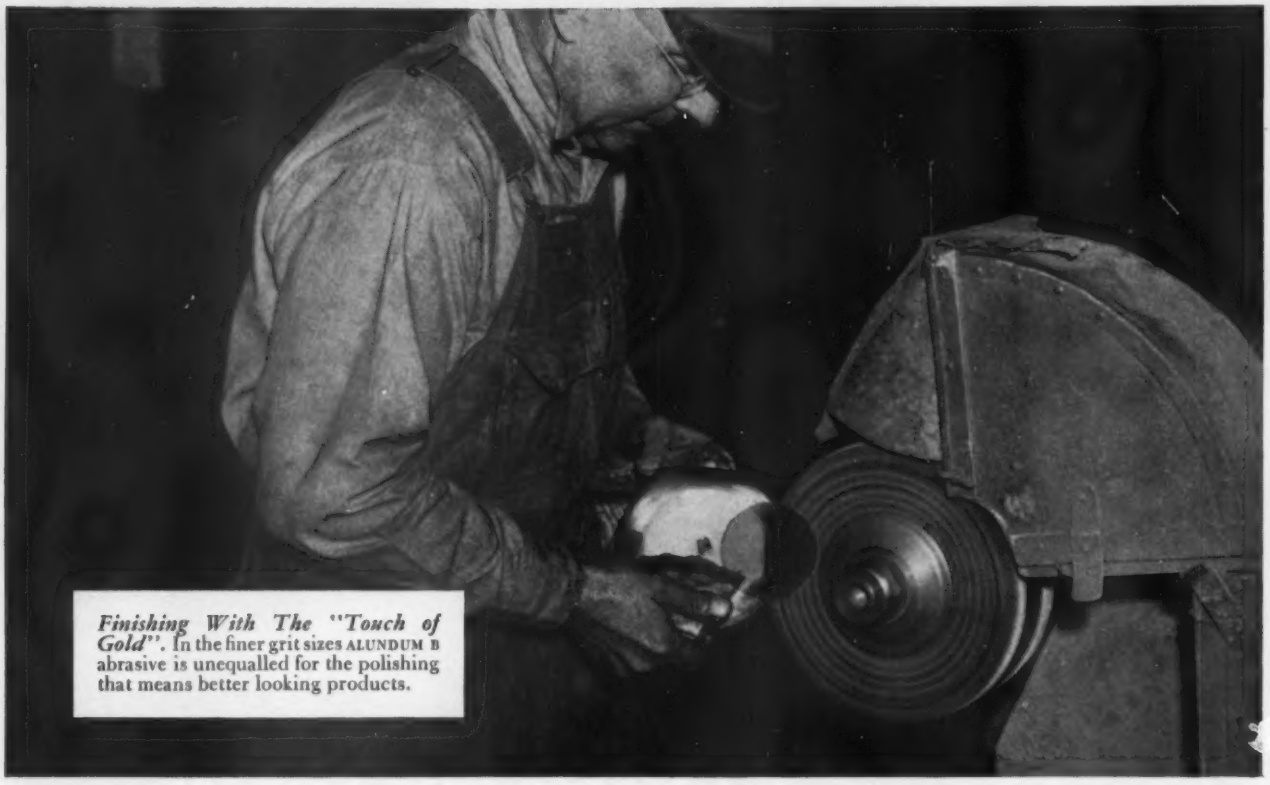
Job Data

MACHINE	Gardner No. 742-42" Grinder.
TOOLING	Hydraulic work table automatically indexes and fixtures oscillate work across discs. Work is hydraulically clamped.
PART	Rock bit heads ranging from 3⅞" to 15" in size; steel forgings.
OPERATION	Grinding radius on heads.
STOCK REMOVAL	Up to 5/16"—in one cycle.
ABRASIVES	Two Gardner 42" Yellow Rim WIRE-LOKT® Discs.

GARDNER

precision disc grinders

BELOIT, WISCONSIN, U.S.A.



Finishing With The "Touch of Gold". In the finer grit sizes ALUNDUM B abrasive is unequalled for the polishing that means better looking products.

Across the range of polishing jobs . . .

Norton ALUNDUM* B Abrasive

adds the "TOUCH of GOLD" that steps up production and profits

Roughing With The "Touch of Gold" ALUNDUM B abrasive in the coarser grit sizes, removes stock faster, saves time and money.

In Norton ALUNDUM B abrasive you get a truly all-purpose polishing grain, expertly engineered to cut costs and improve product quality "across the board" in your polishing operations. Here are some typical advantages that mean top performance in every set-up:

- ***Uniform grain shape,*** the result of careful processing that eliminates flats and slivers, leaving only solid, blocky grains that stand up better and polish faster.
- ***Uniform grain sizings,*** with no oversize grains that mar the finish, no undersize grains that skip their share of work.
- ***High capillarity,*** assuring the easy absorption of adhesive that means longer lasting, better performing set-up wheels.
- ***Usable with cement or glue,*** it is equally firm-clinging and efficient with either.
- ***Made in all grit sizes*** from 20 through 240, to cover the widest range of polishing jobs, from roughing to fine finishing.

See your Norton Distributor for prompt deliveries of Norton ALUNDUM polishing abrasive. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

G 283

Making better products . . . to make your products better

NORTON

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

Left: U. S. Slide Feed with Plain Straightener mounted on left-hand side of a conventional open-back press to feed from left to right. Also illustrated are a U. S. Combination Stock Oiler and Wiper, and Automatic Vertical Centralizing Type Stock Reel.

The Answer to Your Press Feed Problems

ACCURACY—U. S. Slide Feeds are recognized as the most accurate automatic feeds on the market for feeding material into punch presses. The slide block, which contains the blade to grip the material, reciprocates on hardened and ground slide rods between adjustable stops, insuring controlled accuracy of feed length.

VERSATILITY—They can be arranged for feeding left to right, right to left, back to front, front to back, etc. They can be used for feeding steel, brass, copper, aluminum, paper, cardboard, fibre, plastic, etc. in coils; or for butt feeding short lengths over .030" thick and of suitable stiffness.

AUTOMATIC OPERATION—The use of a U. S. Slide Feed converts the press into an automatic machine, resulting in reduced costs and increased production. All the operator has to do is thread and start new coils of material.

Write for Bulletin 80-A, giving details and specifications on the complete line of U. S. Automatic Press Room Equipment.

U.S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides — U. S. Multi-Millers
U. S. Automatic Press Room Equipment — U. S. Die Sets and Accessories

Left: U. S. Slide Feed with U. S. Plain Straightener mounted for feeding right to left on press with crankshaft running from front to back instead of left to right, as on conventional presses. Also in photo is a U. S. Automatic Coil Cradle.

Let us give you a Helping Hand
Turn to G.S.
With Your Small Gear Problems
If there was ever a place to turn to, for *real* help on Small Gearing, *this is it!* Because so many manufacturers do this, G.S. holds the enviable position of "WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF FRACTIONAL HORSEPOWER GEARING." Here, you too can expect the kind of friendly, helpful cooperation and engineering know-how that can prove a valuable asset to your business. ★ So, if extreme UNIFORM accuracy in quantities of hundreds or thousands, is an important consideration to you, by all means grasp the "Helping Hand" we offer. See for yourself exactly how G.S. Small Gearing, and our 38 years of specialization, results in speeding production, cutting costs and improving product performance for our customers.
FRACTIONAL HORSEPOWER
GS
GEAR
Specialties, Inc.
2635 WEST MEDILL AVENUE
CHICAGO 47, ILLINOIS
SPURS • SPIRALS • HELICALS • BEVELS • INTERNALS
WORM GEARING • RACKS • THREAD GRINDING
WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARING
Gear Specialties
GEAR
GET G.S. TECHNICAL DATA Free!
See where and how we mass-manufacture Small Gearing to uniformly fine tolerances. Folder contains 23 pictures of Small Gears, plant views, as well as Diametral and Circular Pitch Tables. Ask for your copy on company stationery, please!

ARMSTRONG

Quality TOOLS

NOT A COST, BUT AN INVESTMENT

That Pays Year after Year . . .

Buy ARMSTRONG TOOL HOLDERS and TOOLS for today's jobs and they will bring you added profits thru the years. With ARMSTRONG TOOL HOLDERS you will be permanently tooled up for whatever comes, for each is a multi-purpose tool that takes cutter bits ground to many shapes. Each is an efficient tool, refined thru a half century of world wide use. Each has strength beyond any need, extra strength resulting from endless research and the most modern closely controlled manufacturing methods.

ARMSTRONG TOOL HOLDERS are inexpensive too, for they are produced in great numbers. They are instantly available because they are carried in stock by all leading supply houses in sizes and types for every operation on lathes, planers, slotters and shapers; for standard operations on turret lathes and screw machines. They are profitable in use because they permit the highest speeds and heaviest feeds and "Save: All Forging, 70% Grinding and 90% High Speed Steel."

ARMSTRONG Lathe and Milling Machine Dogs are permanent tools too. They are drop-forged from special open hearth steel, are heat treated to extreme stiffness and toughness. They have alloy steel screws hardened at the tip to prevent up-setting and have double life, for hubs are made oversize to permit re-tapping.

ARMSTRONG Quality pays back over and over again. *Write for new S-48 catalog.* It offers many opportunities to conserve profits.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 W. ARMSTRONG AVENUE • CHICAGO 30, ILL.

the NEWEST member of a BULLARD 3rd

HORIZONTAL BORING MILLING and DRILLING MACHINE

PENDANT CONTROL

Complete machine control from a movable station for feed and speed selections, directional feed and traverse for Spindle, Head, Table and Saddle

Additional Features...

Both Screw and Rack Feed to the Spindle

Massive 4-Way Bed, Head, Headpost and Rear Post for rigidity

Spindle Speed up to **2000 R.P.M.**

Replaceable Ways, chrome hardened, on Bed and Saddle

Optical measuring equipment for head and table (optional)

For Full

Famous Family

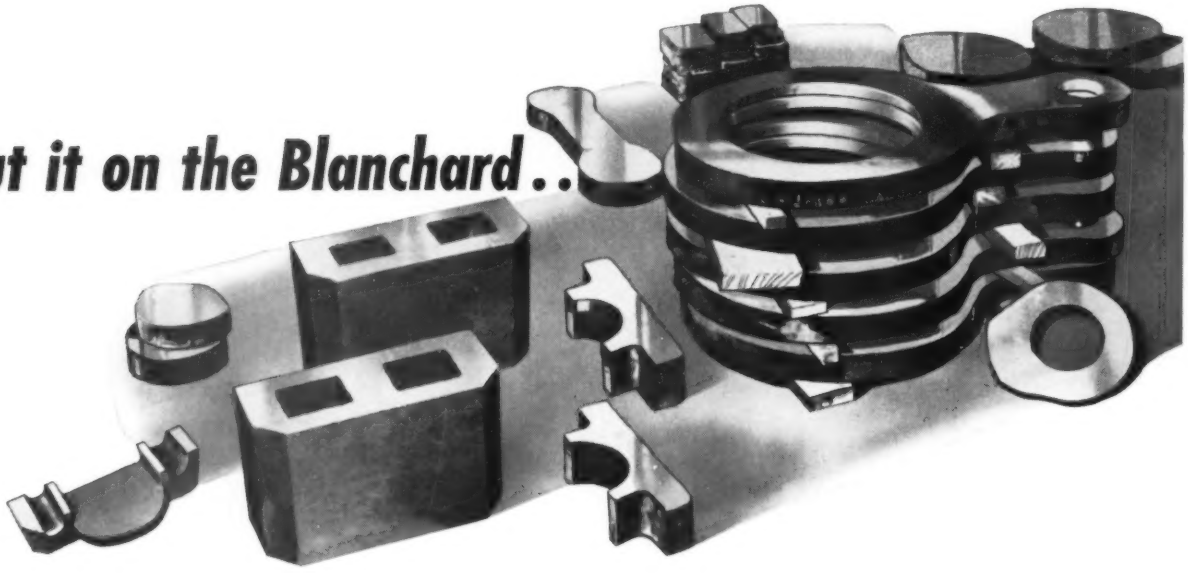
SEVENTY FIFTH
1880 BULLARD 1955
ANNIVERSARY

Information call your nearest Bullard Sales Office, or Distributor or write

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

Put it on the Blanchard..



it's versatile! Large and small shops alike find this Blanchard, with 72" diameter magnetic chuck, ideal for fast, precision grinding of miscellaneous work.

it holds multiple small pieces or plates, castings and die blocks up to 80" across corners, directly on the magnetic chuck. Irregularly-shaped workpieces are easily held with simple fixtures. (Custom-built grinders of this type can handle work 30" high.)

it's fast—with a hard wheel, soft steel can be "hogged off" at a rate of 10 cubic inches per minute.

it's precise – with a soft wheel, hardened steel ways are regularly ground flat and parallel to .001", with surface finish of 5 micro inches!

No wonder shopmen say this Blanchard No. 42-72 is "tops for versatility"!

Send for free copies of "Work Done on the Blanchard" (fourth edition), and "The Art of Blanchard Surface Grinding".

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

"AMERICANS" WORKING FOR NORDBERG

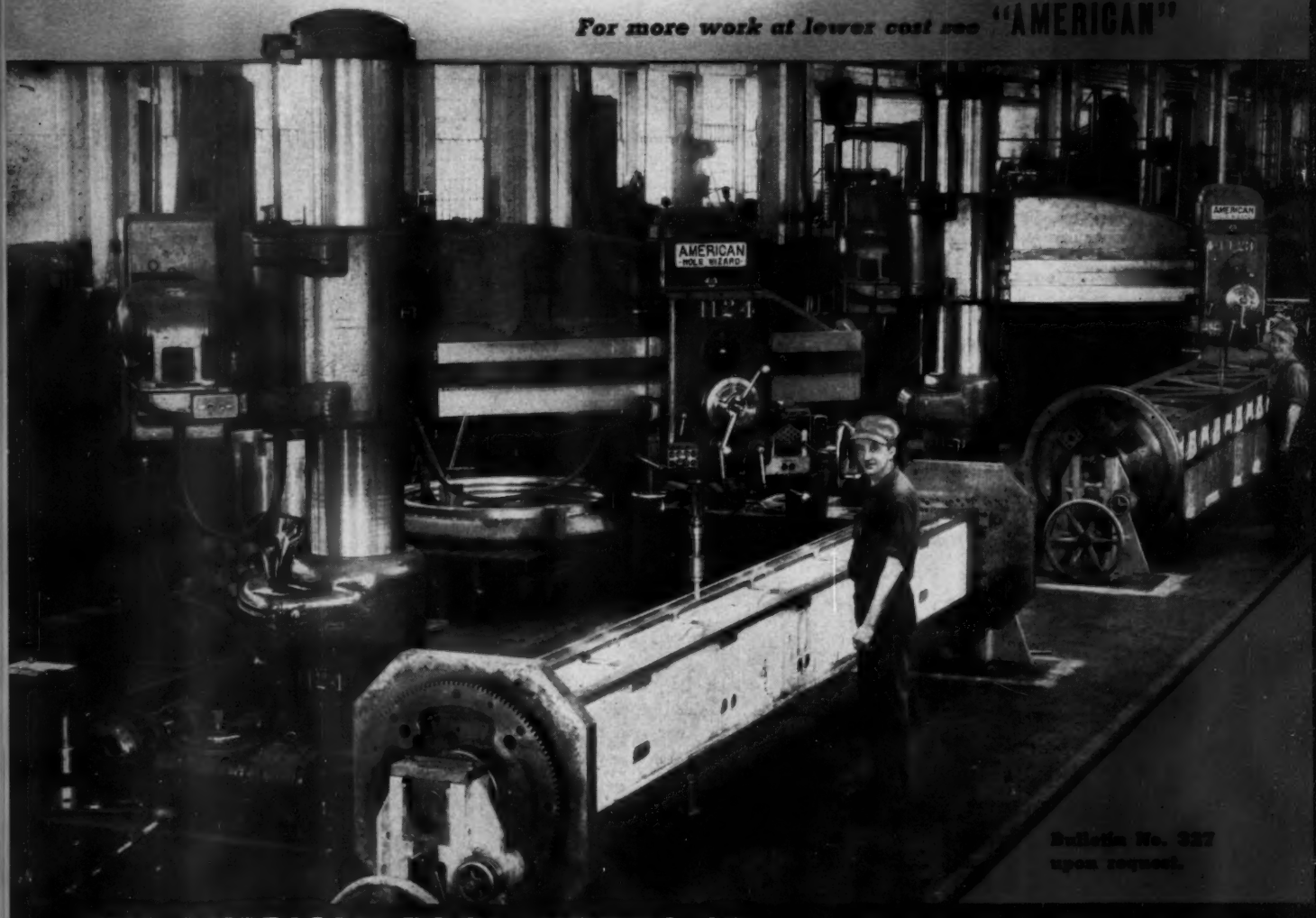
helping to profitably produce the quality products for which Nordberg Manufacturing Company of Milwaukee, Wisconsin is known the world over.

These "AMERICAN" Track Type Hole Wizard Radials mounted on mobile bases speed up drilling, tapping and boring operations in long, heavy work pieces by bringing the tool to the work rather than moving the work to the tool.

The work pieces are mounted in elaborate trunnion jig fixtures so different work planes may quickly be presented to the tool and a high degree of accuracy maintained.

The quality of Nordberg products is universally recognized. We are proud indeed that so many "AMERICAN" Lathes and Radial Drills contribute to it.

For more work at lower cost see "AMERICAN"



Bulletin No. 337 upon request.

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

Cut Costs and Increase Efficiency with

HELLER

PRODUCTION MILLING MACHINES

HELLER knee type milling machines are available in either horizontal or vertical construction for use with carbide cutters for heavy milling work.

They are rigidly built for the heaviest production milling with powerful drive units with 18 speeds to a roller bearinged spindle.

The control is through push button selection and machines can be furnished standard or equipped with full automatic cycling control or with copy milling control through electro-hydraulic feeler.

Importing Heller Machines Since 1926

HELLER MACHINE CO., 114 Liberty St., New York 6, N. Y.

ANTISEP
All-purpose water-soluble base

—for a real COOL cut . . .

get the COOLING ACTION of a mountain stream and faster, cleaner cutting, too!

ANTISEP All-purpose Base gives you everything you want for tough machining jobs. It has extra lubricity to insure fast, free-cutting on tough metals, helps impart a finish to make any machinist proud. It is anti-welding, helps prevent chip build-up on tools. But all of this is only part of the real value of ANTISEP.

Because this super base is mixed with water, it assures *cool* operation at maximum feeds and speeds and at *low cost*. You can step up production measurably, and still have a smoke-free plant and finer finished work.

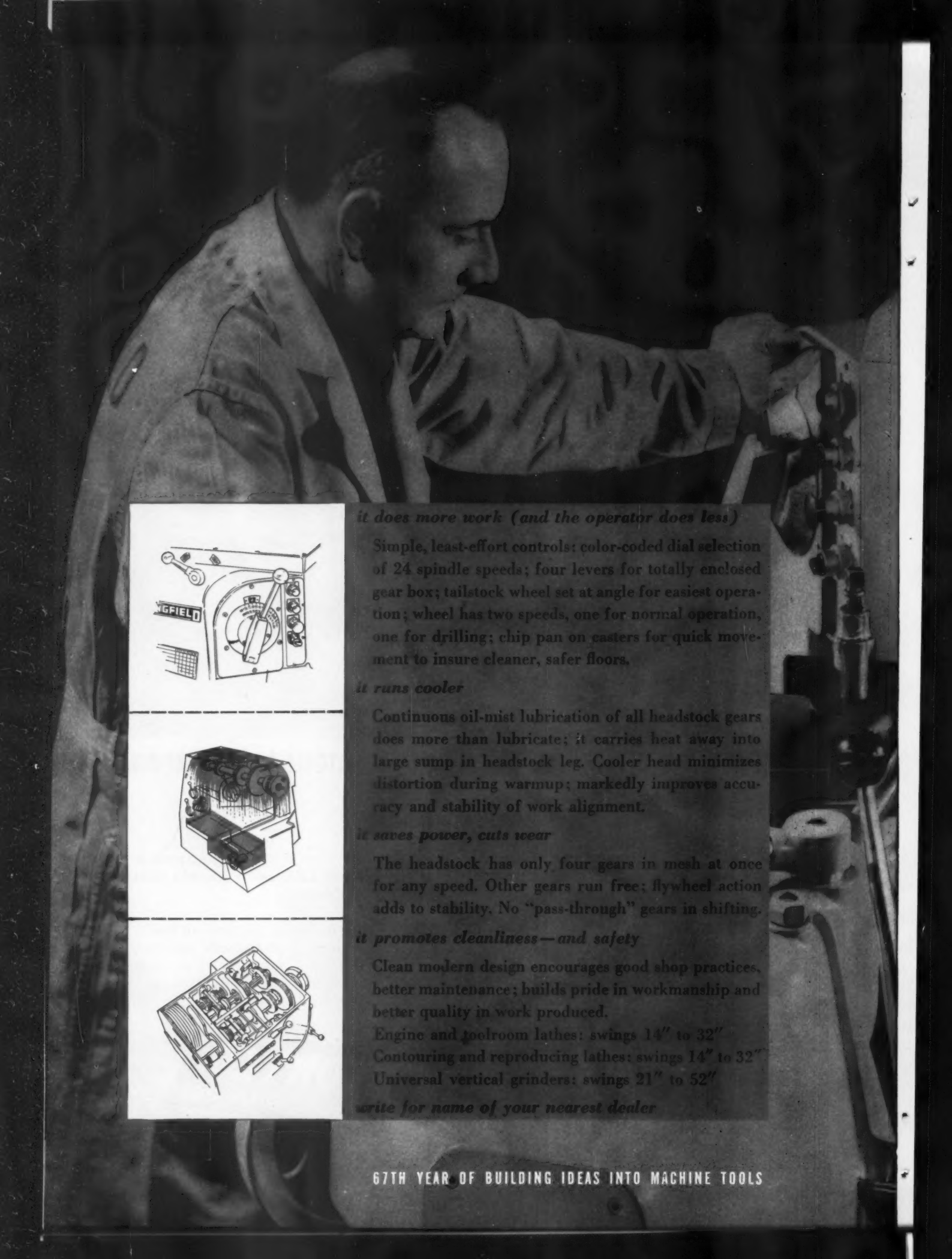
Put ANTISEP to the test on the toughest jobs in your plant and see the evidence with your own eyes. Call your Houghton Man today or write direct to E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

ANTISEP
All-purpose water-soluble base

. . . a product of

E. F. HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .



it does more work (and the operator does less)

Simple, least-effort controls: color-coded dial selection of 24 spindle speeds; four levers for totally enclosed gear box; tailstock wheel set at angle for easiest operation; wheel has two speeds, one for normal operation, one for drilling; chip pan on casters for quick movement to insure cleaner, safer floors.

it runs cooler

Continuous oil-mist lubrication of all headstock gears does more than lubricate; it carries heat away into large sump in headstock leg. Cooler head minimizes distortion during warmup; markedly improves accuracy and stability of work alignment.

it saves power, cuts wear

The headstock has only four gears in mesh at once for any speed. Other gears run free; flywheel action adds to stability. No "pass-through" gears in shifting.

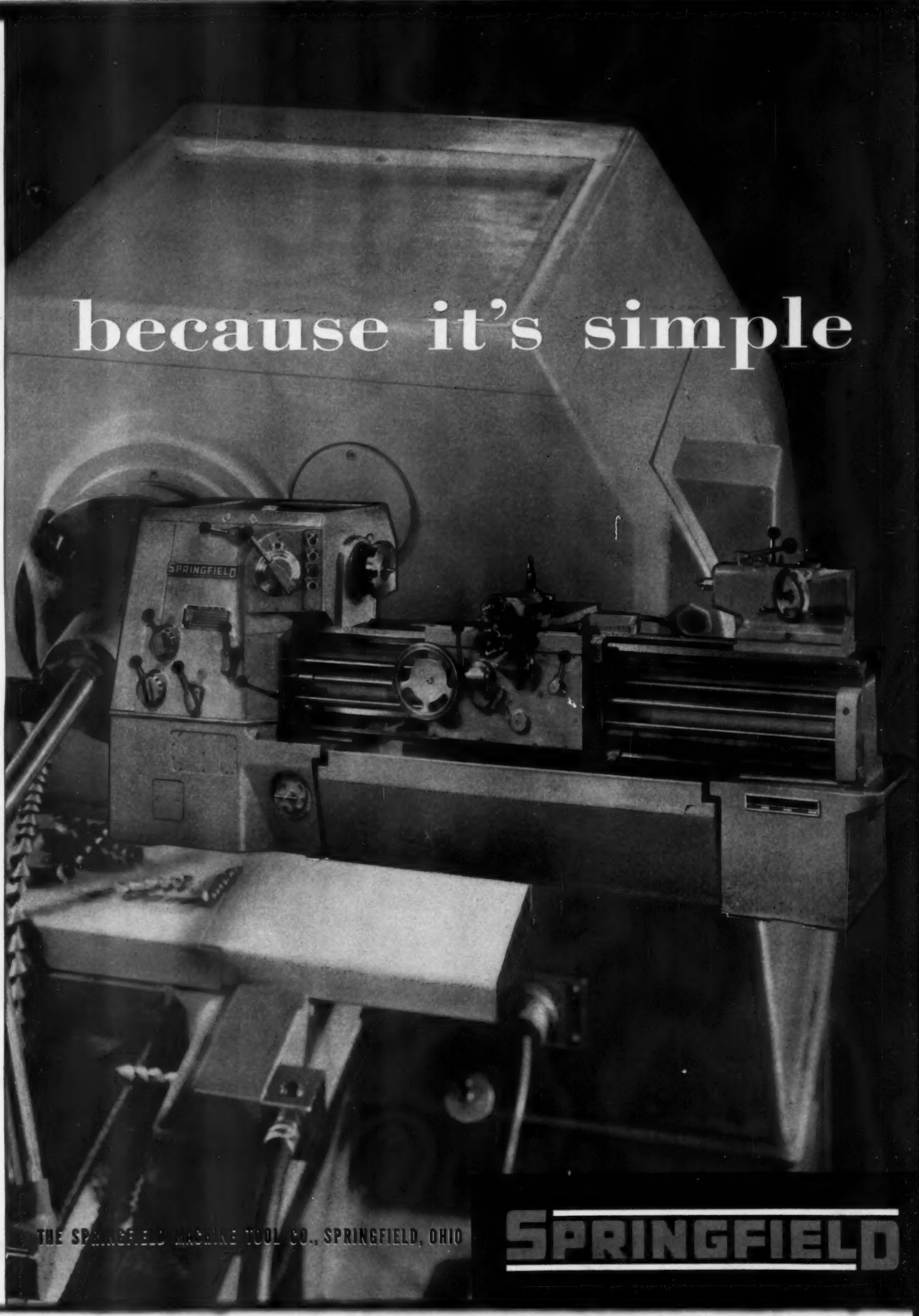
it promotes cleanliness—and safety

Clean modern design encourages good shop practices, better maintenance; builds pride in workmanship and better quality in work produced.

Engine and toolroom lathes: swings 14″ to 32″
Contouring and reproducing lathes: swings 14″ to 32″
Universal vertical grinders: swings 21″ to 52″

write for name of your nearest dealer

67TH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS


because it's simple
SPRINGFIELD
THE SPRINGFIELD MACHINE TOOL CO., SPRINGFIELD, OHIO
SPRINGFIELD

BUTTERFIELD

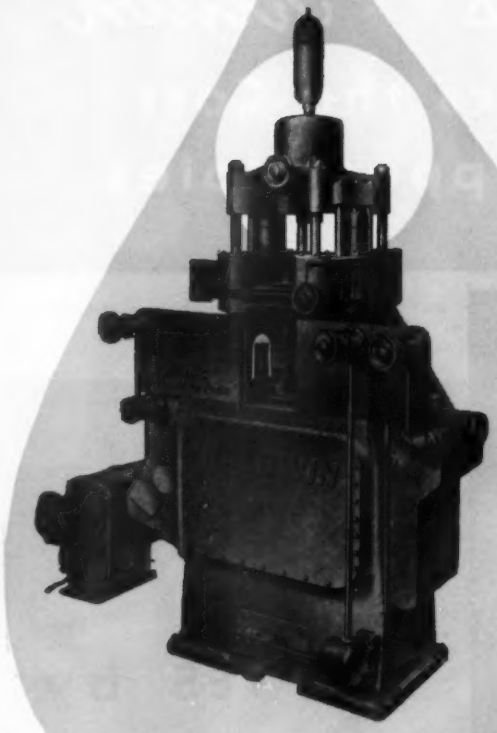
A COMPLETE LINE OF QUALITY cutting tools is now available from your Butterfield distributor. Reamers are made to the same exacting standards as Butterfield Taps, Dies, Milling Cutters, Drills, Counterbores and End Mills.

FOR FAST, ECONOMICAL SERVICE
CALL YOUR **BUTTERFIELD** DISTRIBUTOR

UNION TWIST DRILL COMPANY
BUTTERFIELD DIVISION
DERBY LINE, VERMONT, U. S. A.

HYDRAULIC HEAD

avoids overloading, controls densities, in new Baldwin powdered metal presses . . .



YOU'LL GET a whale of a lot more by specifying a Baldwin Model "L" or Model "C" for your next powdered metal press. Why? Because these new Baldwin presses are the very first designed specifically for compacting powdered metals.

Here's just one of the reasons why it'll pay you to standardize on Baldwin to take care of your pressing needs . . .

Both the 50 ton ("L") and 100 ton ("C") presses feature a hydraulic head which supplies opposing pressure for the upper punch. It works like this: if the compressing pressure exceeds the setting of the hydraulic accumulator, the upper punch "gives" to the limit of the setting . . . that enables the hydraulic head to benefit you in three very vital ways:

1. It prevents overloading of the press, thus prolonging the life of both tools and press.
2. It makes it possible to compact powdered metal parts to more uniform densities.
3. It permits use of more delicate tools.

For copies of new bulletins with full technical information on Models "L" and "C" please write to our Department 4502, Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pennsylvania.

BALDWIN BLH LIMA-HAMILTON

BALDWIN-LIMA-HAMILTON

Philadelphia 42, Pa. • Offices in Principal Cities

BALANCED Action

Lowers the Cost of Tapped Holes

Winter Taps perform with BALANCED ACTION, giving you very high hole-accuracy with long tool life. Only Winter makes BALANCED ACTION TAPS.

GAGES by WINTER

Like Winter Taps, this new line of Gages is manufactured with extreme care. Winter's BALANCED ACTION principle means the utmost in accuracy. . . . Catalog on request.

PHONE YOUR WINTER DISTRIBUTOR

WINTER BROTHERS COMPANY
Rochester, Michigan, U.S.A.

Distributors in principal cities. Branches in New York • Detroit • Cleveland • Chicago Dallas • San Francisco • Los Angeles

Division of National Twist Drill & Tool Co.

WINTER

Announcing

Carbide Tipped Tools

Now available: National Twist Drills, Reamers, End Mills, Milling Cutters, and Counterbores with *carbide tips.*

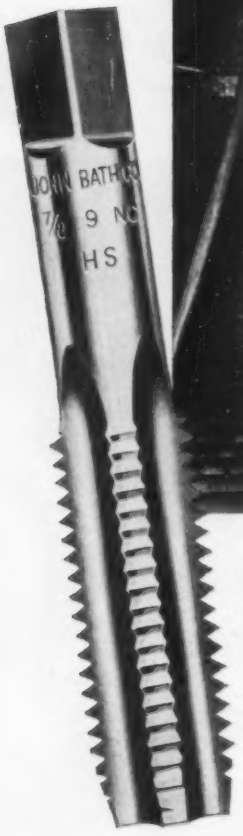
PHONE YOUR NATIONAL DISTRIBUTOR

NATIONAL TWIST DRILL AND TOOL COMPANY, Rochester, Michigan, U.S.A.

Distributors in principal cities. Branches in New York • Detroit • Cleveland • Chicago • Dallas • San Francisco • Los Angeles

National

NATIONAL TWIST DRILL & TOOL ROCHESTER, MICH., U.S.A.



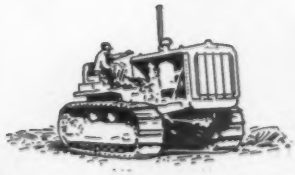
Contributing to CATERPILLAR Leadership

Here's a shop-eye view of Bath Taps at work, threading a Caterpillar* diesel engine block.

On the production line of "the World's Number One Earthmover" . . . Bath Taps help to uphold a manufacturing tradition based on getting top precision out of every plant operation.

When you see a Cat* machine on the job . . . and you see them often . . . you'll find performance proves the quality is there . . . even in small, but important tasks like tapping.

A Bath representative will be glad to tell you why industrial leaders depend on Bath regular and custom built ground thread taps for longer life, less down-time and lower production costs.



*Both Caterpillar and Cat are registered trademarks ®

Insist on BATH TAPS for BETTER THREADS

JOHN BATH & CO., Inc.

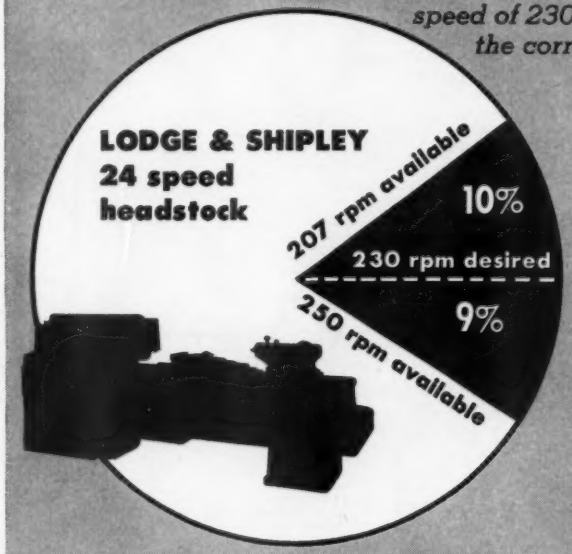
22 Grafton St., Worcester, Mass.

PLUG CYLINDRICAL AND THREAD GAGES • RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

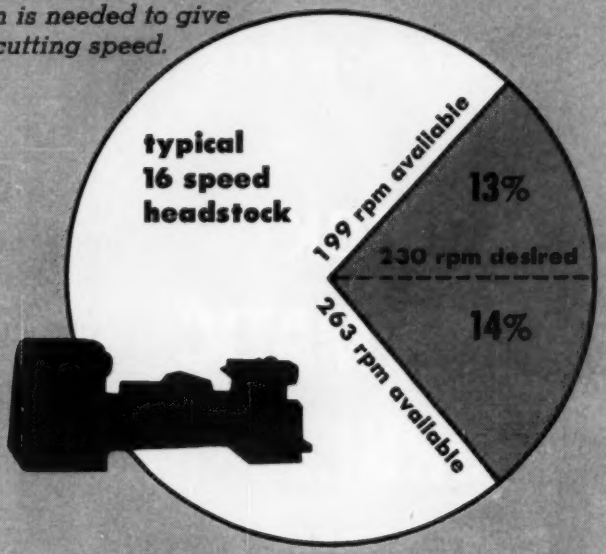
GET MORE PRECISE SELECTION of RIGHT CUTTING SPEEDS

with LODGE & SHIPLEY 24 SPEED HEADSTOCKS due to smaller speed increments over a wider range.

To illustrate our point, suppose a spindle speed of 230 rpm is needed to give the correct cutting speed.



On the Lodge & Shipley 16-inch, 24-speed Headstock, 207 and 250 rpm are available. Choosing 250 rpm gives a speed that's within 9% of the desired speed.



On a typical 16-inch, 16-speed Headstock, 199 and 263 rpm are available. Choosing 199 rpm gives a speed that's within 13% of the desired speed.

On these same lathes The Lodge & Shipley 24-speed Headstock also has a wider range—14 to 1160 rpm . . . compared to the typical 16-speed headstock's 16 to 697 rpm range.

Considering a new lathe? You'll find it well worth investigating the number of spindle speeds, the size of the speed increments and the range. The more speeds you have (up to a practical limit) and the smaller the increments between speeds . . . the more perfect choice of cutting speeds you can make. Insufficient spindle speeds severely limit your selection as indicated in the data above.

Lodge & Shipley Model X Lathes give you 24 speeds . . . up to 50% more than some comparable lathes. That's a 50% better chance to select the correct speed and obtain truly economical production.

Call a Lodge & Shipley representative or write for literature on this subject. The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

Lodge & Shipley *....your* LODGE-*ical choice!*

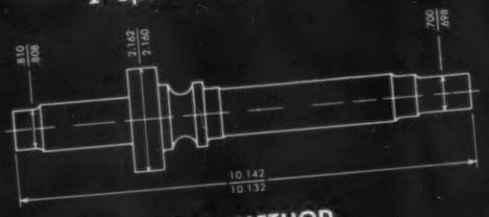
SUGGESTION BOX

Check MONA-MATIC TURNING FOR YOUR JOB

MONA-MATIC METHOD
2 operations, 11¼ min.

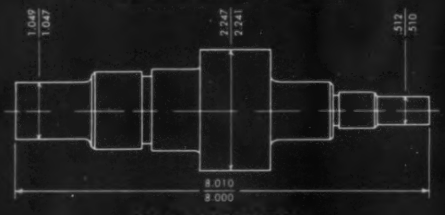
OLD METHOD
10 operations, 81½ min.

MONA-MATIC METHOD
2 operations, 6¾ min.



OLD METHOD
11 operations, 27¾ min.

MONA-MATIC METHOD
2 operations, 4 min.



OLD METHOD
12 operations, 22¼ min.

MEMO

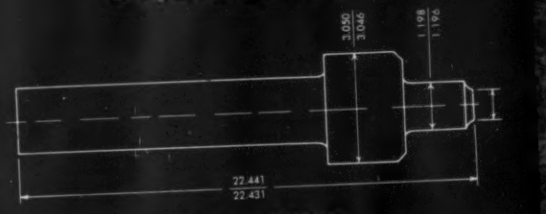
All parts are AMS 6260 forgings. Because they are partially restricted, they cannot be identified by name. In every case, a limit of ± .001" is held on all diameters and dual template control employed. In addition to the tremendous reduction in time, *setup time has been reduced to a marked degree* and *tool costs are much lower*. A further advantage of the Mona-Matic method is the fact that *many grinding operations, heretofore necessary, have been eliminated*. While these 5 examples of time saving are extraordinary, it is a matter of record that the time saving on 22 other jobs, run over the same machines, ranges from 50 to 70%.

Want the facts on Mona-Matic turning? High time! Send the coupon for illustrated brochure with complete data, specs., and job reports.
The Monarch Machine Tool Company, Sidney, Ohio

SAF
FIRS

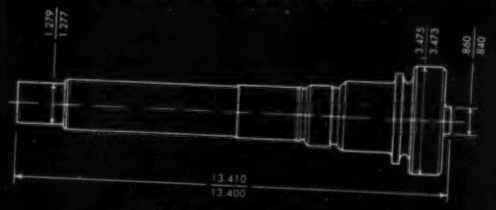
BULLETIN BOARD

MONA-MATIC METHOD
3 operations, 12 min.



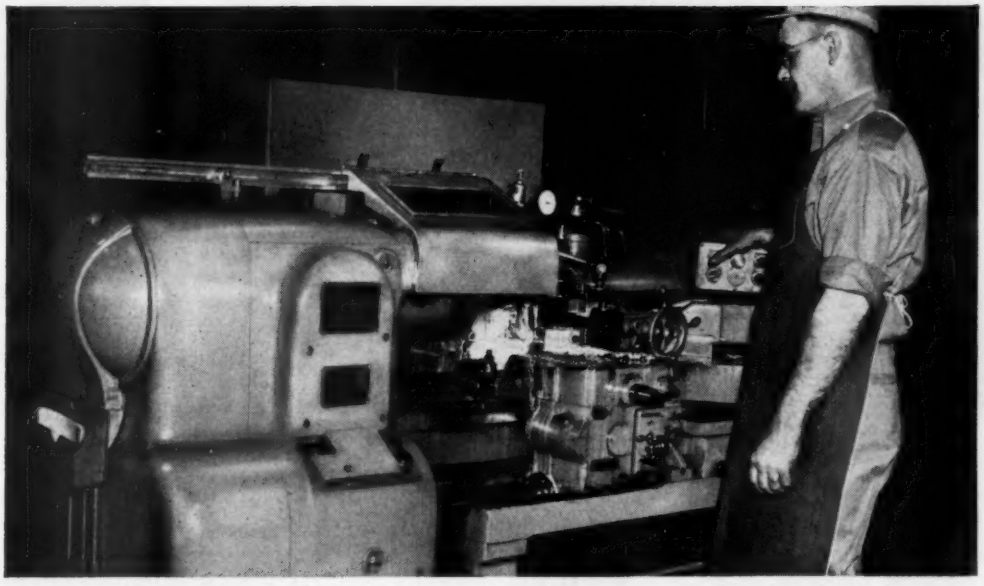
OLD METHOD
11 operations, 63½ min.

MONA-MATIC METHOD
2 operations, 8 min.



OLD METHOD
12 operations, 41 min.

TURNING NEWS



THE MONARCH MONA-MATIC

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

Gentlemen: I am interested in your Mona-Matic story and would like to receive your illustrated Booklet, with complete data and job performance reports. Please send me your Booklet 1805.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

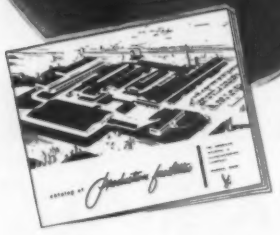
"Americ elded" Sinews in every B-52

America's long-range bomber, the B-52, is another plane that flies with American Welded components.

From titanium rings to aluminum oil tanks, today American Welding supplies the major U. S. aircraft engine manufacturers.

If your product requires welded components or you think welding may be the best method of fabrication — our Product Development Division will be glad to work with you. Write or call today.

THE AMERICAN WELDING AND MANUFACTURING COMPANY
400 DIETZ ROAD • WARREN, OHIO



SEND FOR FREE CATALOG OF PRODUCTION FACILITIES

Find out what American Welding can do for you.

WELDING • MACHINING • FABRICATING

AMERICAN WELDING

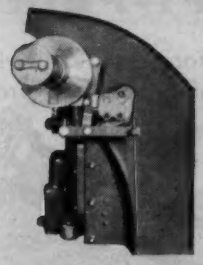
only FEDERAL has

so many big features!

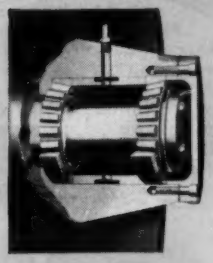
• **Patented Brake Design.** Spring tension permits expansion — available with automatic release, if desired.

No. 7 Flywheel type
Capacity, 80 tons

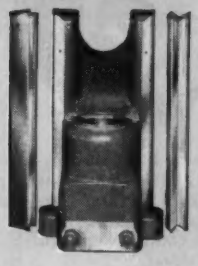
• **Solid Web-Type Flywheels.** An important safety factor.



• **Non-Repeat Clutch.** An exclusive Federal feature.



• **Timken Bearing Flywheels.** Eliminate wear on crankshaft, readily adjusted.



• **Longer "V" Ways, Gibs.** Added speed, accuracy. Hand-scraped to perfect alignment.

plus **Oversized Crankshafts • Generous Shut Height • Front-Operated Recline**

Here are important features, typical of the extra quality built into every FEDERAL Press. And they add up to give FEDERAL users a definite edge, production-wise and cost-wise. For these rugged, precision-built presses boost output, eliminate accidents, maintain high production schedules. Offered in four major classes—Standard, Dial Feed, High Speed and Special presses from 6 to 80 tons. Call your Federal representative. *Write for new catalog.*

THE FEDERAL PRESS COMPANY
501 Division Street, Elkhart, Indiana

FEDERAL *Open Back Inclinable* PRESSES

30 Years of Quality Construction

How to Cut the Cost of Gaging Threads

with TAFT-PEIRCE JOB-RATED GAGES

The *best* gage for most jobs provides the *best* combination of speed, wear-resistance, upkeep, and initial cost. Here are some comparisons that will help you keep costs to a minimum.

Thread Plugs

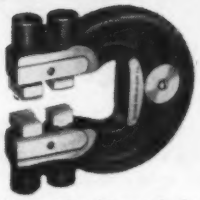
T-P Limit Thread Plug Gage. Standard hardened steel gages are lowest in initial cost and are preferable when soft or moderately hard materials are being inspected in limited quantities. Taper-Lock up to 1.510". Reversible from #0 to ½". Reversible Tri-Lock above 1.510".

T-P Electrolized Gages. With only a modest increase in initial cost, substantially longer wear life can be obtained with this exclusive surface treatment. Many users report up to 3 times longer gage life.

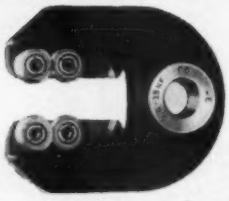
T-P Carbide Thread Plug Gage. For exceptional resistance to abrasion or scratching and maximum wear life. Furnished in both standard and special sizes — from #8 machine screw size up.

Rings & Snaps

T-P Thread Ring Gages. Lower in initial cost than other gages for external threads, they check a combination of all thread errors but cannot distinguish between them.



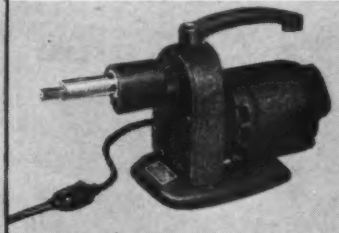
T-P Adjustable Thread Snaps. Faster than ring gaging, and just as accurate, they check lead, angle, and all other thread elements. Pitch diameter is variable.



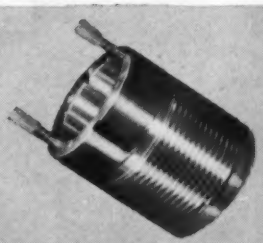
T-P Roll Thread Snaps. Same as adjustable, with *rolls* for gaging members. Since gaging members rotate, wear is spread over greater surface and service life increased.

Special Gages

T-P Rotochek (Flexible Shaft Model). Fastest thread gaging method yet devised. Push —and the gage screws into the work. Release the pressure and it stops. Pull—and it disengages. Can be used with most standard T-P plug or ring gages.

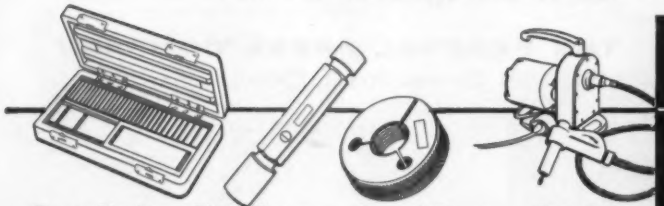


T-P Rotochek (Bench Model). Permits bringing work to gage, instead of gage to work. Like flexible shaft model, records indicate it triples rate of parts inspection.



T-P Thread Concentricity Gage. Typical of the infinite variety of special gages made to order by T-P every year. This one checks size and location of internal threads.

For the complete story on these items and many more, send for your copy of the Taft-Peirce Handbook.



Gage Blocks Plain Gages Thread Gages Rotochek

T-P means Top Precision

THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, R. I.

30 Years of Quality Construction

IN THE
AIRCRAFT INDUSTRY, IT'S

UNION

UNION DISTRIBUTORS SERVE THE NATION

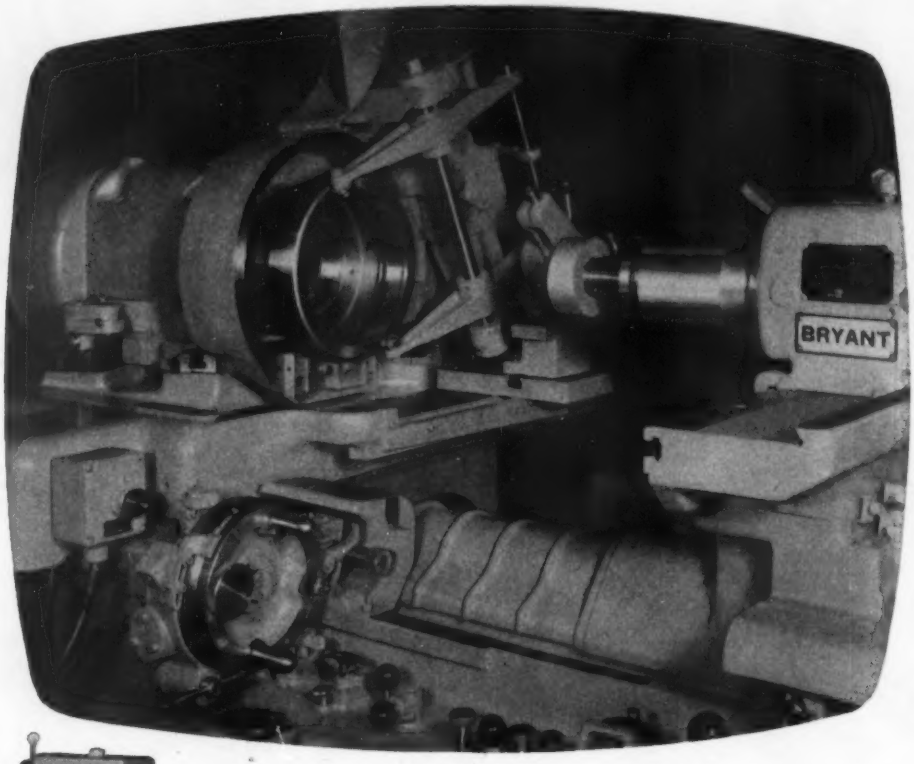
FOR
- SPEED
- ECONOMY
- RELIABILITY
- PERSONAL CONTACT

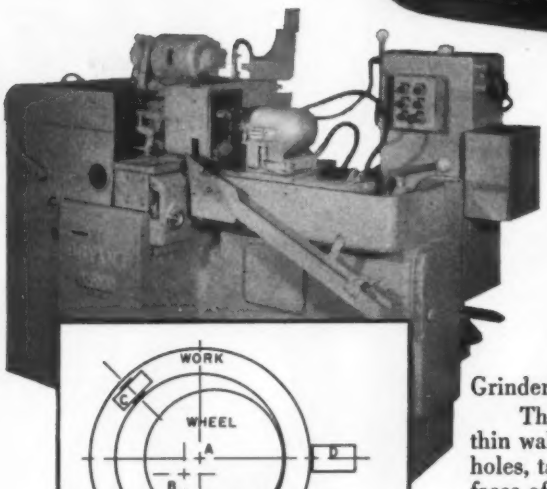
CALL YOUR UNION DISTRIBUTOR

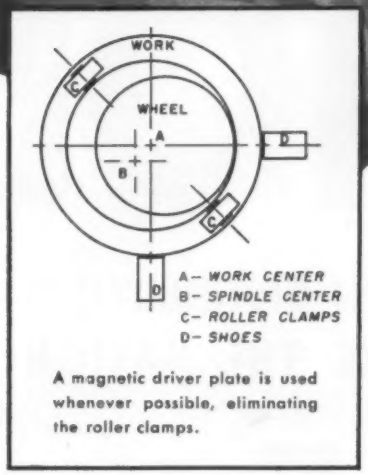
UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

OWNERS AND OPERATORS OF: S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.
BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec

SHOE CENTERLESS GRINDING WITH...







A magnetic driver plate is used whenever possible, eliminating the roller clamps.

BRYANT internal grinders gives you HIGHER PRODUCTION and LOWER COSTS

Experience-proven tooling and fixtures help make Bryant Internal Grinders exceptionally accurate . . . efficient . . . productive.

The shoe-type centerless internal grinding fixture is typical. Extremely thin wall rings can be shoe centerless ground to close tolerances. Straight holes, tapered holes and contours, having cylindrical, conical or other surfaces of revolution can be ground by this method.

Shoe centerless grinding ensures bore grinding to a uniform wall thickness with concentricity held to less than .0001". It is particularly successful when previous O.D. and face grinding operations have been closely controlled. Distortion caused by conventional clamping is eliminated.

Shoe centerless grinding speeds up loading and unloading of work parts, whether manual or automatic. Change-over from job to job is easier and faster than with conventional grinding fixtures.

Bryant grinders offer you operating economy—as well as peak production rates. Their adjustable precision alignment helps ensure maximum original accuracy throughout their lives. They require only a minimum of maintenance. Factors like these cut cost per piece.

***WRITE** for our "Alignment" booklet. Ask, too, for a reservation card for our sound, color movie, "Alignment for Better Internal Grinding"—free showings arranged for engineering groups.*

BRYANT

chucking grinder co.

SPRINGFIELD, VERMONT, U.S.A.

Offices: Indianapolis • Cleveland • Chicago • Detroit • Mt. Vernon, N. Y. • Philadelphia

Internal Grinders • Boring Machines • Internal & External Thread Gages • Granite Surface Plates

BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec

Whatever kind of gears you make...
Whatever way you make them

National Tool Co.

can supply the right type cutting tool because we make *all* types

National Tool Co., with 50 years experience in the manufacture of special cutting tools, makes *all* varieties of gear cutting tools for *all* types of spur, helical and worm gears—as well as for sprockets and splines. Whatever your gear requirements—large or small—National engineers can help you decide the most efficient method of producing them. Many gear manufacturers have found it profitable to look to National Tool Co. for all their gear cutting tool requirements.

Gear Shaving Cutters

Hobs

Rack Type Gear Shaper Cutters

Gear Shaper Cutters

Involute Gear Cutters

Master Gears

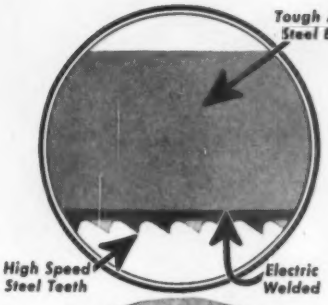
Herringbone Gear Cutters

1905 • 1955 Our 50th Year

National
TOOL CO.
Cleveland 2, Ohio

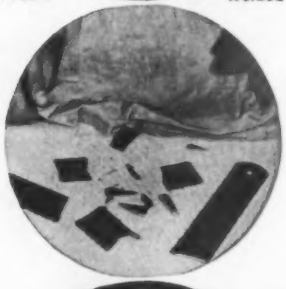
Representatives in major industrial centers

Features Essential to Top Hack Saw Blade Performance



UNBREAKABLE—to saw FASTER.

Composite construction (a narrow high speed steel tooth edge electrically welded by the MARVEL-invented process to a tough, non-brittle alloy steel body), means that MARVEL high-speed-edge can be subjected to the MAXIMUM feed pressure that any hack sawing machine is capable of applying. MARVEL blades need not be "babied" for fear of breakage!



SHATTERPROOF—for SAFETY.

MARVEL blades never shatter or "explode" as do the ordinary "brittle" blades shown at left which so often cause personal-injury accidents such as the loss of an eye or severe laceration and expensive damage to the sawing machine. Operators who use MARVEL blades exclusively soon "get the habit" to apply heavier feeds, greater blade tension, higher speeds—to do their work faster, because they know they are SAFE with MARVEL.

SHARPER, PREMIUM-STEEL TEETH—to wear LONGER.

Teeth are accurately machined by a MARVEL-invented process that assures sharper tooth points and positive uniformity of tooth shape and degree of set from end-to-end of every MARVEL blade. The steel used in the tooth edge is carefully selected from the finest high speed steels available throughout the world, regardless of cost or source—truly premium steels, without premium cost.

QUALITY CONTROL—to assure UNIFORMITY.

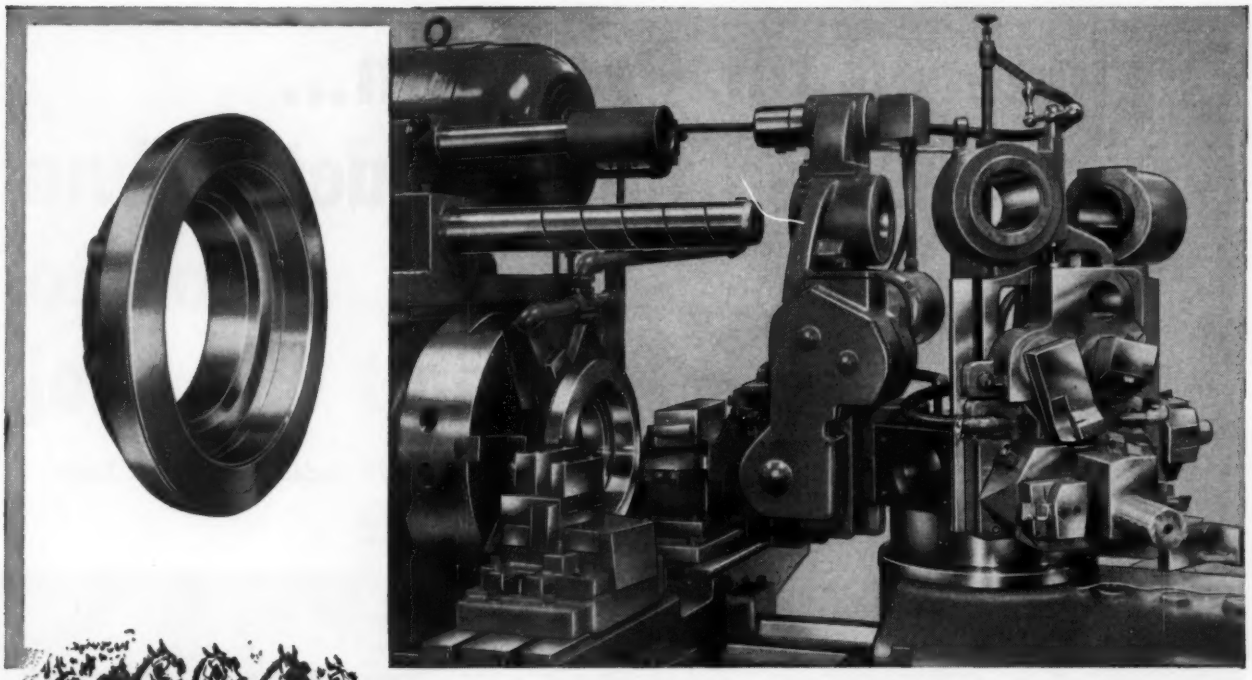
With more than a quarter century of *experience* in inventing, perfecting, and producing welded-edge hack saw blades, MARVEL has provided its own laboratory with the most modern metallurgical instruments and techniques known to the applicable sciences for the specific purpose of maintaining highest possible quality control. Coupled with rigid tests and meticulous inspection of every MARVEL blade, uniform quality is assured.

These are only a few features that make MARVEL High-Speed-Edge Blades such outstanding performers.

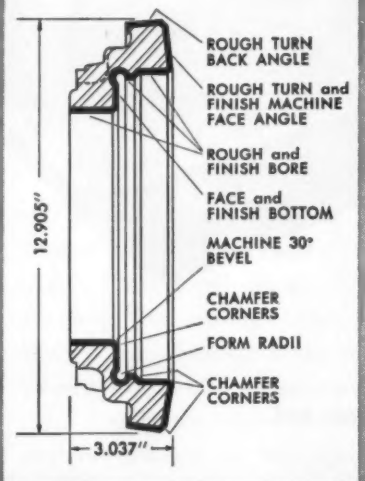
Ask for the latest MARVEL Cutting Tool Bulletin and the name of your closest MARVEL Distributor.

Metal Cutting
MARVEL SAWS
Better Machines—Better Blades

Manufactured only by
ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.



FORTY HORSES "pulled the team" that made this bevel gear blank



The Powerful 6DREL-40 Automatic Turret Lathe -- and **P&J** Tooling

Machining a forged-steel truck bevel gear blank — 14 distinct cuts with tungsten carbide tools in just 5.88 minutes (including chucking time) — takes a team with plenty of horses to pull it . . . A TEAM LIKE THE **P & J 6DREL-40 AUTOMATIC** (NOW WITH 40 HORSEPOWER), PLUS JOB-ENGINEERED **P & J TOOLING.** Here's the team to choose for doing your tough jobs faster . . . and at a lower per-unit cost!

If you're looking for real productive power, it will pay you to look at the 6DRE-40 and 6DREL-40 Automatic Turret Lathes. Write for informative booklet describing these Automatics. Ask for Bulletin No. 128 . . . or ask the P & J Tooling Engineer to submit recommendations based on your sample parts or prints.

POTTER & JOHNSTON CO.
PAWTUCKET, RHODE ISLAND
SUBSIDIARY OF
PRATT & WHITNEY
DIVISION NILES – BEMENT – POND COMPANY

P&J

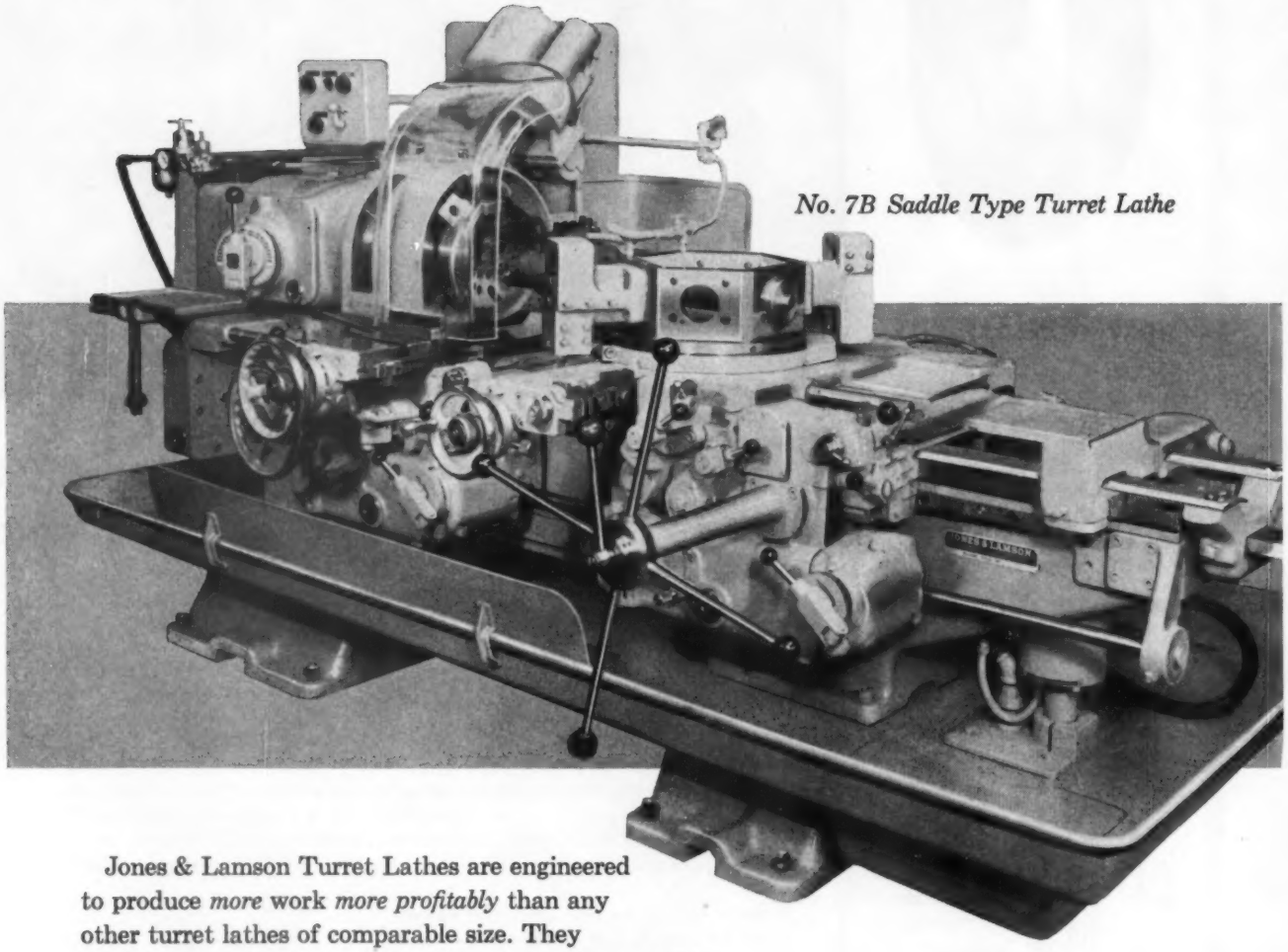
PRECISION PRODUCTION TOOLING FOR MORE THAN FIFTY YEARS

WRITE DIRECT OR CONTACT YOUR NEAREST PRATT & WHITNEY BRANCH OFFICE

BIRMINGHAM • BOSTON • CHICAGO
CINCINNATI • CLEVELAND • DETROIT
LOS ANGELES • NEW YORK • PHILADELPHIA
PITTSBURGH • ROCHESTER • SAN FRANCISCO • ST. LOUIS
EXPORT DEPT., PAWTUCKET, R. I.

AGENTS: DALLAS, THE STANCO CO.
HOUSTON, WESSENDORFF, NELMS & CO.

Engineered for Precision... Powered for Production...



No. 7B Saddle Type Turret Lathe

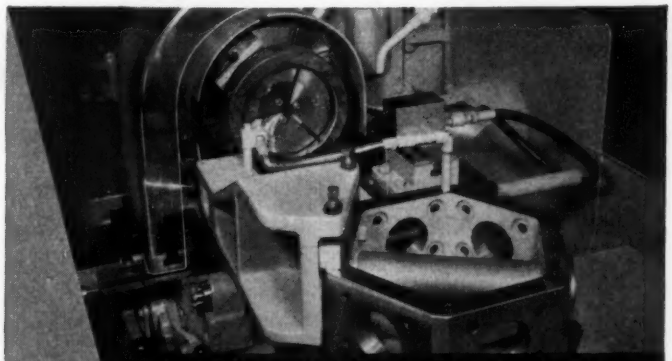
Jones & Lamson Turret Lathes are engineered to produce *more* work *more profitably* than any other turret lathes of comparable size. They have the rugged, rigid construction that makes possible greater accuracy and the use of Hi-Velocity turning; and they incorporate many superior features that assure PRODUCTIVE CAPACITY unmatched in its class. Adequate spindle speeds and horsepower insure the proper use of carbide cutting tools at surface speeds of 650-750 feet per minute.

J&L JONES & LAMSON MACHINE COMPANY

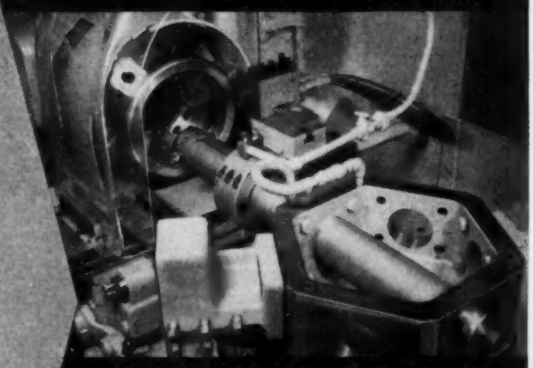
Jones & Lamson offers you a choice of methods for acquiring modern, profit-producing J & L equipment. In addition to outright purchase, J & L makes available several different "Pay-From-Productivity" plans at interest rates of 3¼% and lower (add-on), and a broad variety of lease plans.

Send today for complete details on J & L's machines, methods and Procurement Plans. Simply fill in the coupon, clip it to your letterhead and mail.

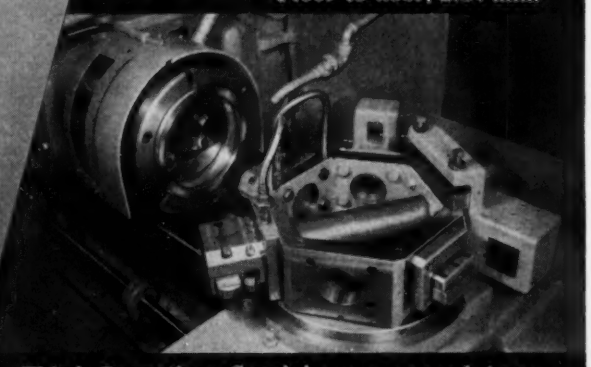
and capable of doing jobs like this...



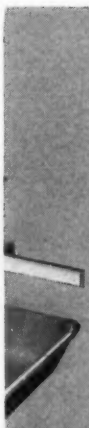
First Operation: One tool mounted on the Hex Turret turns the O.D. while a tool mounted on the rear of the cross slide faces one end. At the end of the facing cut, the radius on the O.D. is formed.
Floor-to-floor, 1.94 min.



Second Operation: Location is taken from the two previous finished surfaces. Boring and I.D. chamfering are performed by using tools mounted on the Hex Turret while facing and forming of the O.D. are finished by tools mounted on the rear of the cross slide.
Floor-to-floor, 2.57 min.



Third Operation: Special wrap-around jaws mounted on a power operated three-jaw scroll chuck are used for holding the finish turned ring when grooving. The groove is formed by a radius tool held in a bar mounted on the Hex Turret (this applies to internal or external straight or taper races). I.D. is also chamfered in this operation.
Floor-to-floor, 1.67 min.



Machine tools do not pay dividends unless they are cutting metal. Engineering the tooling around the parts to be produced reduces the setup time to a minimum, and in many cases doubles the production per labor hour.

In this case high production methods of tooling for automatic lathes were simplified and applied to three 7B J&L Universal Saddle Type Turret Lathes. Inner and Outer Ball Bearing Races and Roller Bearing Races are produced on the same machines. Setup time from one lot to the next does not exceed fifteen to twenty minutes per machine.

MACHINE TOOL DIVISION

UNIVERSAL TURRET LATHES • FAY AUTOMATIC LATHES • AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES • AUTOMATIC THREAD & FORM GRINDERS • OPTICAL COMPARATORS
AUTOMATIC OPENING THREADING DIES & CHASERS

502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

Jones & Lamson Machine Company
502 Clinton St., Dept. 710, Springfield, Vt., U. S. A.

Please send me the J & L Machine Tool Replacement Information Kit.

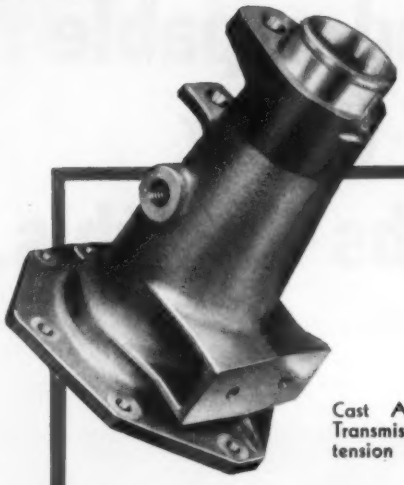
*Name*_____

*Title*_____

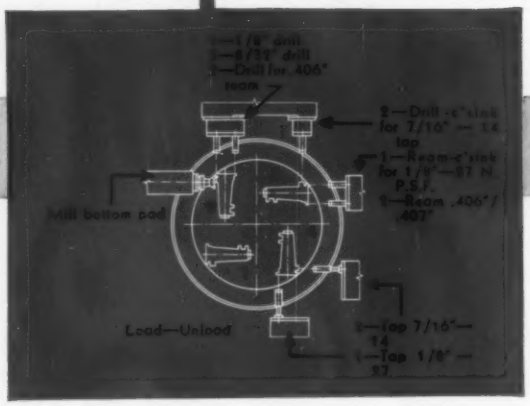
118 *Pieces per hour* 35 *Operations....*

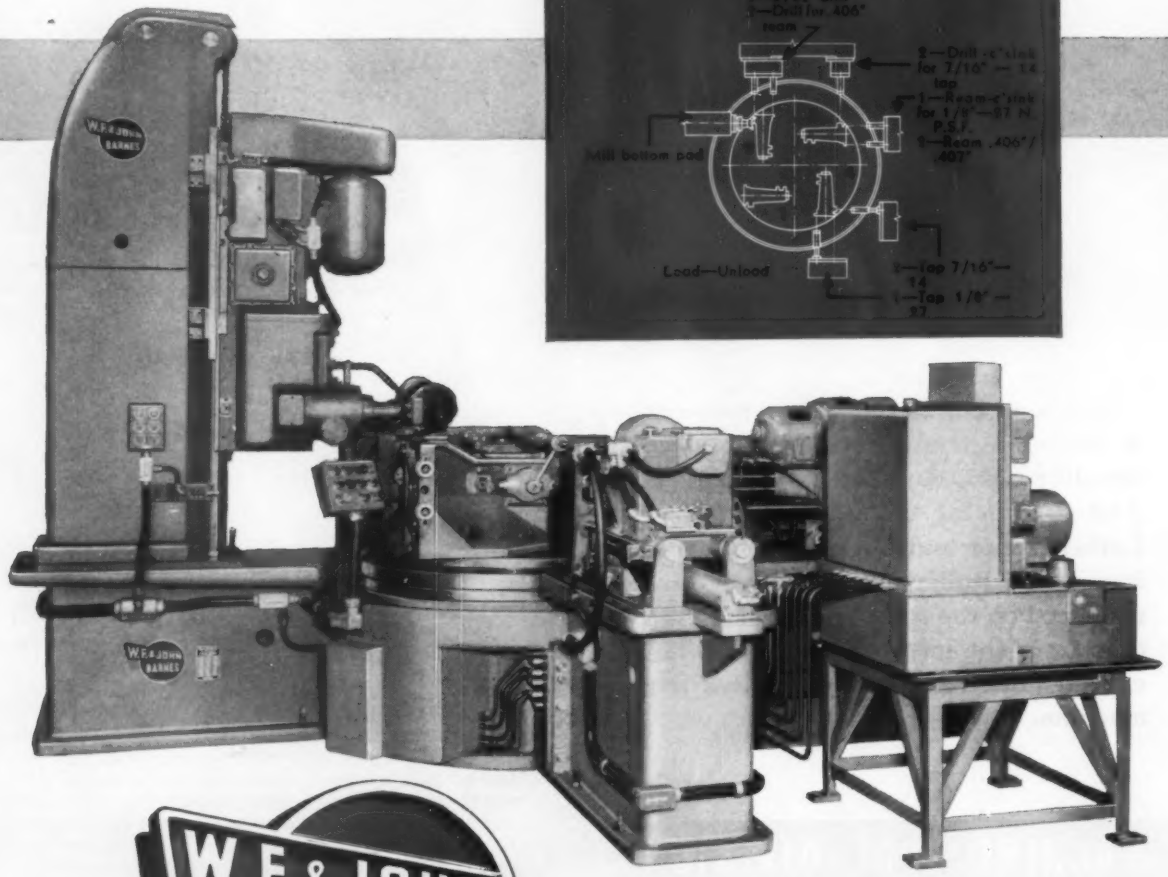
TRANSMISSION EXTENSIONS MACHINED TO CLOSE TOLERANCES ON COMPANION UNITS

Here is another typical example of how W. F. & John Barnes coordinated special machine engineering and building service helps solve complex machining problems. These two companion units, designed to machine cast aluminum automobile transmission extension housings, reduce production costs by combining operations. Note how the parts are positioned and the tooling arranged for efficient machining, and how the over-all design conserves floor space. The two machines perform 35 operations at the required gross production rate of 118 pieces per hour. Whether your production requires large or small machines, you'll find the coordinated services at Barnes can help you solve problems quickly and efficiently.



Cast Aluminum Transmission Extension Housing



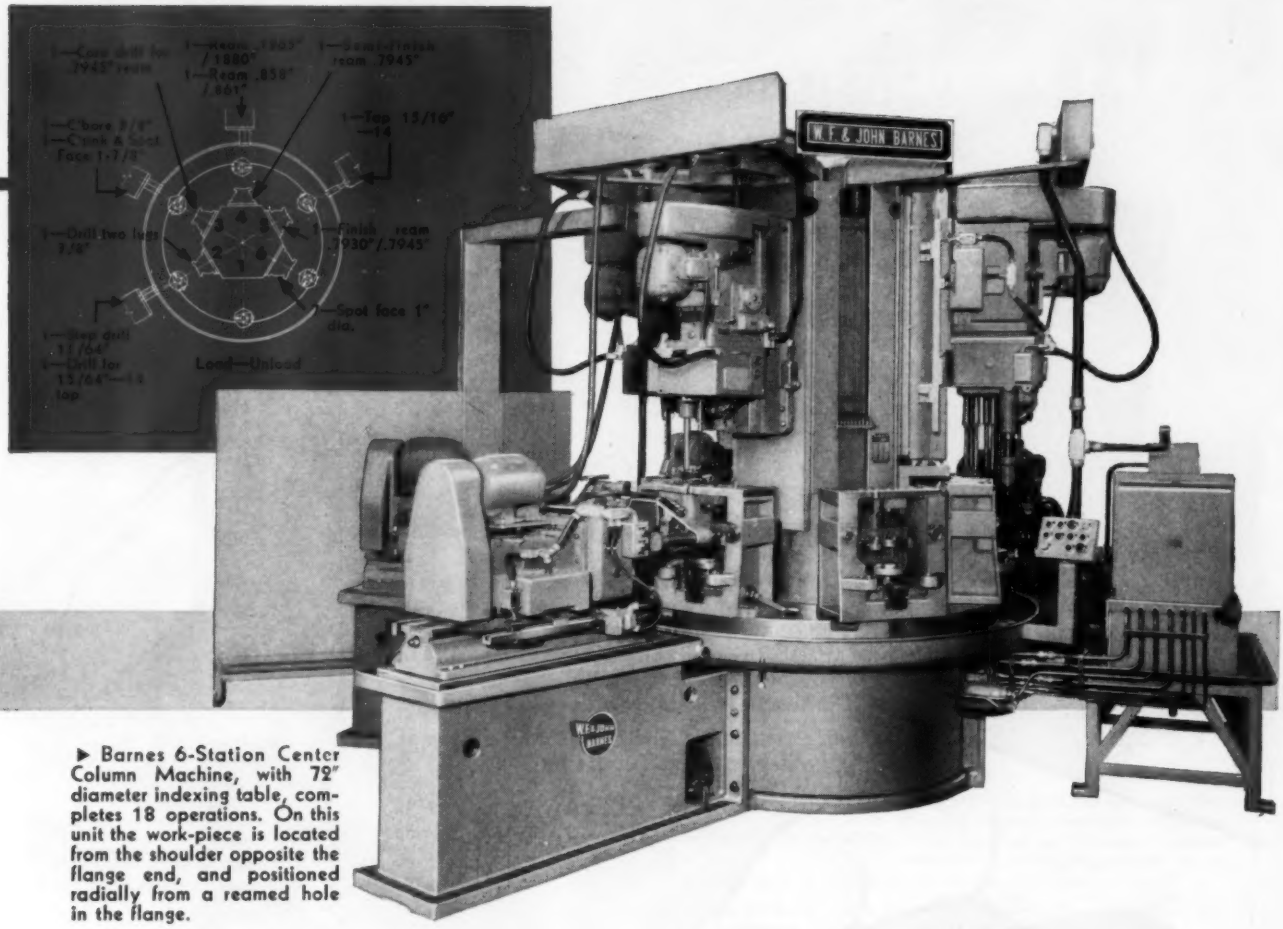


Barnes 4-Station Special Machine with 48" diameter hydraulically operated rotating table. This unit performs 17 operations. Vertical milling of bottom pad in Station No. 2 is completed with a retracting spindle. Fixtures locate part on end bores.

W. F. & JOHN BARNES COMPANY

MULTIPLE SPINDLE DRILLING • BORING • TAPPING MACHINES

....ON W. F. & JOHN BARNES SPECIAL MACHINES



▶ Barnes 6-Station Center Column Machine, with 72" diameter indexing table, completes 18 operations. On this unit the work-piece is located from the shoulder opposite the flange end, and positioned radially from a reamed hole in the flange.

BARNES SPECIAL MACHINE TOOL BUILDING SERVICE INCLUDES

1 **SPECIALIZED MANUFACTURING FACILITIES**—75-year background, large well equipped plant efficiently tooled to produce high production machines.

2 **SPECIAL HYDRAULIC EQUIPMENT**—designed and built to meet JIC standards. Individually engineered units assure smooth, dependable actuation for every requirement.

3 **SPECIAL ELECTRICAL EQUIPMENT and CONTROLS** — individually designed and built for maximum safety and ease of control with circuits that assure the most dependable coordination of all machine functions.

4 **SPECIAL GAUGES, FIXTURES, TOOLS** — designed for each individual machining problem, assure accuracy of operations at high production speeds.

5 **SPECIAL HANDLING AND CONVEYOR EQUIPMENT** — designed and built to reduce work handling, effect maximum safety and efficiency.

6 **COORDINATED DESIGN AND ENGINEERING** Mechanical, Hydraulic, Electrical, Process, Tool, and Fixture Engineers work together at Barnes. Team-work solves complex problems quickly.

Write **FOR FREE DATA**

"Coordinated Machine Engineering" — a free booklet describing modern machines and mass production techniques. Write for your copy today.

401 S. WATER ST., ROCKFORD, ILLINOIS

AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES

TAPS & GAGES *by Card*

Now, Card brings you a precision line of gages along with renowned Card taps. You can specify and use both with complete confidence, knowing that whatever the job demands, you'll get top performance. We assure you that the new line of gages guarantees the same quality that has made Card taps famous over the past 81 years.

Contact your local Card Distributor for prompt deliveries and helpful service.

The CARD Quality

S. W. CARD MANUFACTURING CO.

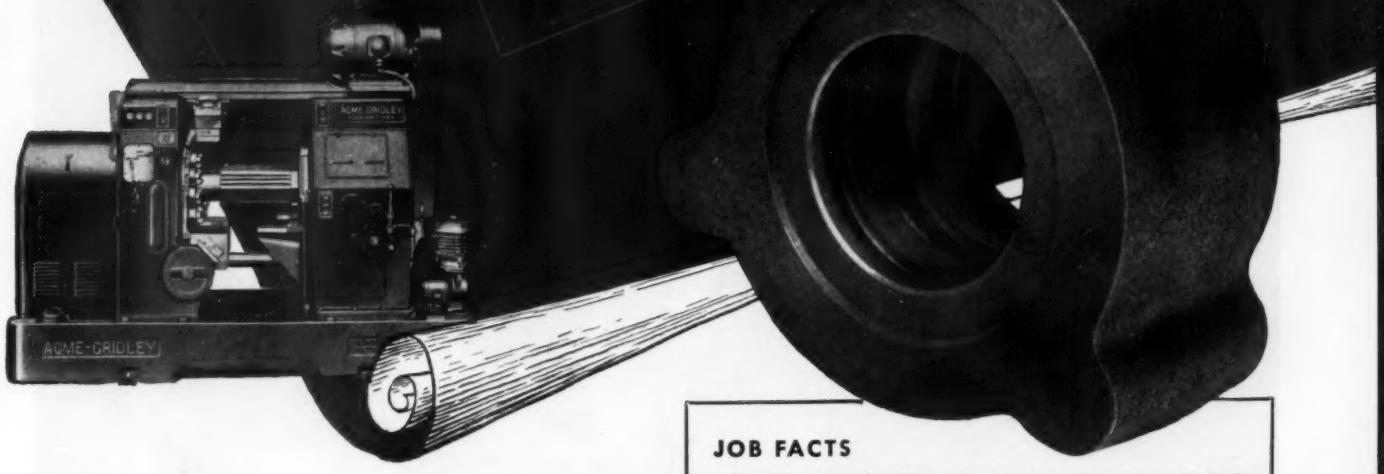
MANSFIELD · MASSACHUSETTS

Division of Union Twist Drill Co. **TAPS · DIES · SCREW PLATES · GAGES**

HOW TO COMPLETE THE JOB *Faster...*

AND STILL GET

MORE ACCURATE PARTS!



When you tool up jobs this way on an ACME-GRIDLEY MULTIPLE SPINDLE CHUCKING AUTOMATIC, you often *complete* the parts in one setup—and they are more accurate and uniform because rehandling and rechucking for second operation work is eliminated.

And the corollary to this is that man hours are released for other work—and space formerly needed for second operation work is saved.

On this cast iron housing, all 17 operations were performed simultaneously, with a *single completely carbide-tooled setup*—on an Acme-Gridley 8-inch, 8-spindle chucker. And because the work on all spindles is always done within the time required for the longest single cut, the floor-to-floor time on this job was at the rate of 61 *completed* pieces per hour.

This is where multiple spindle *planning* pays off.

JOB FACTS

- **Roughing and finishing operations performed on this SAE 120-121 Cast Iron Housing include multiple recessing shown in sketch. The three grooves were rough recessed in one station and finished recessed together with front and rear counterbore in another position.**
- **Three rough boring passes were finish-reamed with accelerated reaming attachment in one pass.**
- **Carbide tooling used throughout.**

And this is where the vast experience of National Acme tooling engineers (they have helped plan the cost-reduction of more than 300,000 jobs) wins and holds preference for Acme-Gridley bar and chucking automatics—in hundreds of shops.

These engineers will give you sound advice; unbiased advice in both job setup and equipment—from the world's only manufacturer of a *complete line* of multiple spindle bar and chucking automatics and fully automatic turret lathes.

Send for Catalog CM-51 or ask for our recommendations

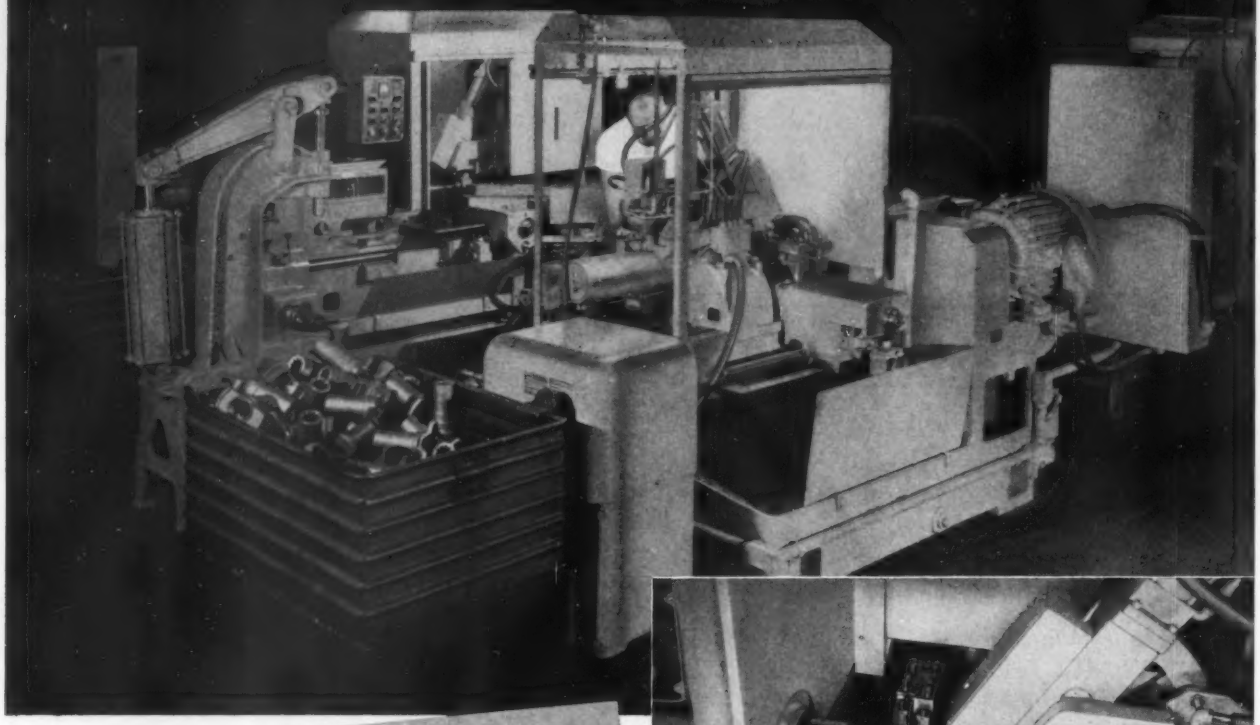
OUR JOB: to provide the *Right Machine* for **YOUR JOB**

Acme-Gridley 4, 6 and 8 Spindle Automatic Bar and Chucking Machines • Fully Automatic Turret Lathes (Bar and Chuck Type) • Hydraulic Thread Rolling Machines • Automatic Threading Tools • Switches • Solenoids • Contract Manufacturing.

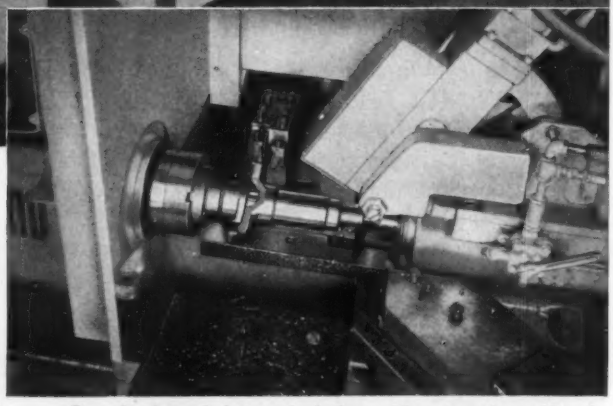
THE NATIONAL ACME COMPANY

171 EAST 131st STREET • CLEVELAND 8, OHIO

Turning Time Cut From 4 1/2 to 2 Minutes Per Piece



With a SUNDSTRAND Automatic Lathe Equipped With Automatic Multi-Cycle Tracer Control



Two Sundstrand Automatic Lathes with automatic multi-cycle tracer control for machining Universal Joint parts.
Inset: Close-up of tracer control.

Various sizes and types of Universal Joint parts are turned on these Sundstrand Automatic Lathes equipped with Automatic Multi-Cycle tracer control. On one lot of parts, machining time was cut from 4-1/2 to 2 minutes per part. Savings on other sizes of parts are comparable.

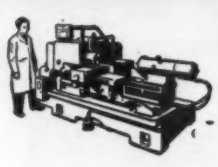
The lathe is also equipped with adjustable facing attachment for chamfering or undercutting. These high producing Sundstrand Automatic Lathes are easily changed over for handling the various sizes of parts.

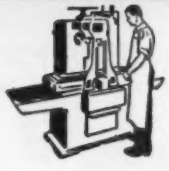
SUNDSTRAND

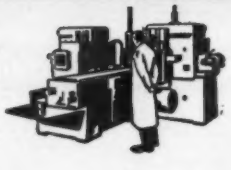
"Engineered Production" Service

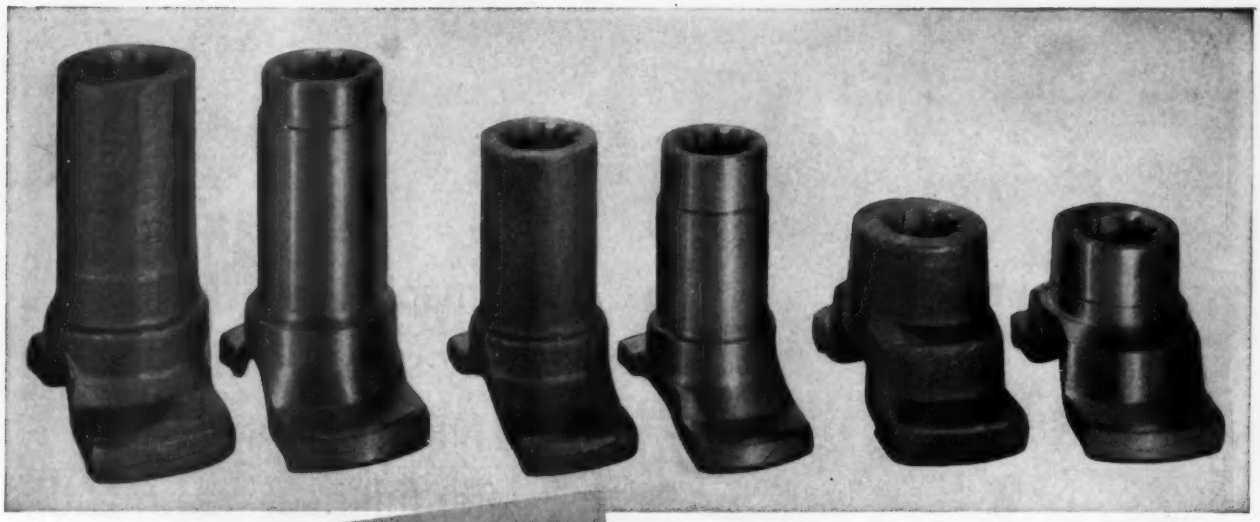
*REG. U.S. PAT. OFF.

AUTOMATIC LATHES | SIMPLEX RIGIDMILS | DUPLEX RIGIDMILS









Unit Produces Ruff, Semi-Finish and Finish Cuts In One Automatic Cycle

With this attachment and controls, ruff, semi-finish and finish cuts can be taken with one turning tool in one automatic cycle. The control can be set up for one, two or three cycles depending on stock removal and job requirements. The regular cross feeding rear slide can be used to square up shoulders, chamfer, etc. Cycle changing is quick and easy, usually 15 minutes or less, with actual time dependent on the number of facing tools required in the job set-up. Illustrated above are typical parts turned at Mechanics Universal Joint Division, Borg Warner Corp., Rockford, Illinois, using Sundstrand Automatic Lathes equipped with the new Sundstrand Multi-Cycle Tracer Control. The Universal Joint parts illustrated are just a few of many that can be turned efficiently on this equipment. The diameters and tapers are turned with simple single point tools. Small lots or large can be handled easily and quickly.

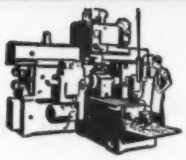
features

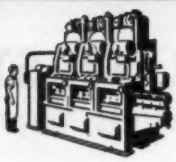
1. Easily changed over for different jobs.
2. One template for all three cuts.
3. Change-over time to standard operation approximately 45 minutes.
4. Three turning cuts in one automatic cycle.
5. Cross feeding rear slide operates in automatic cycle for facing, grooving, chamfering, etc.
6. Because of the complete automatic cycle, one operator can run several machines.

Free Data

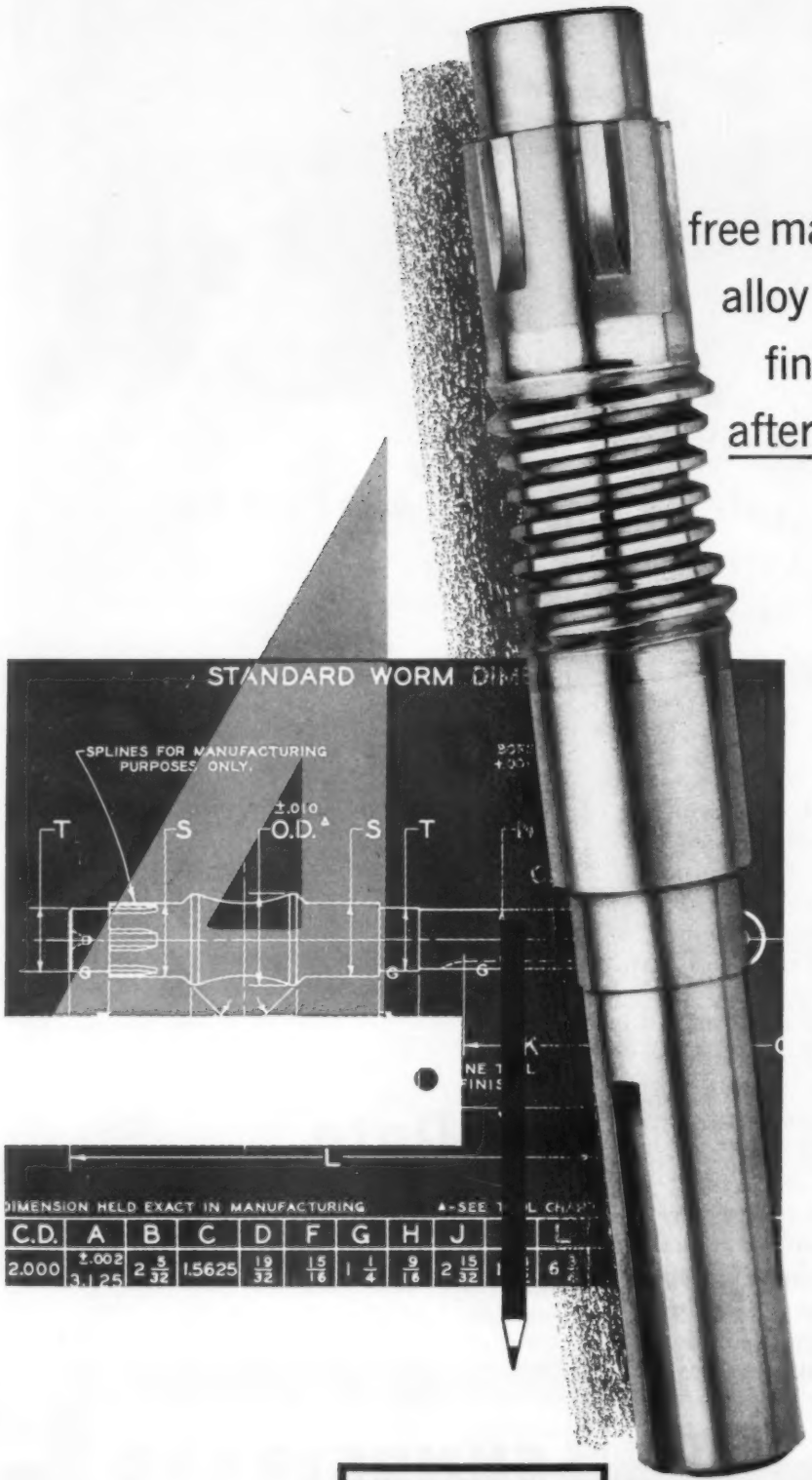
Additional information is available in this new folder. Write for your copy today. Ask for bulletin 153.

TRIPLEX RIGIDMILS | SPECIAL MACHINES





SUNDSTRAND
Machine Tool Co.
2533 Eleventh St. • Rockford, Ill., U.S.A.



free machining **MAX-EL** alloy steel worm finish machined after full heat treatment...

This double enveloping worm of Crucible MAX-EL® 3½ alloy steel, made by Cone Drive Gears, Division of Michigan Tool Company, was completely machined *after full heat treatment.*

As our customer writes: "This requires an extremely free-cutting material in order to secure desired accuracy, and we have used MAX-EL quite successfully, due to its free machinability in the heat-treated state (Rockwell C 35-38)."

But try MAX-EL for yourself. You'll find that its free machining qualities, freedom from distortion, deep hardening characteristics, and the longer tool life you will get from its use, will help your production line run smoother. For further information, and *fast* delivery of MAX-EL — *call Crucible.*

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **ALLOY STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

MALLORY
Standard Electrode Holders
make tough welding jobs easy

IF YOU ARE LOOKING for a way to weld around corners, into channels or at other hard-to-reach spots, there's a good chance that you will *not* require a special electrode holder . . . with its extra cost.

A Mallory standard holder can probably do exactly the job you need. This diversified line offers you the variety of custom-fitted designs with the economy and ready availability of standard stock items. Included are offset, paddle type, low inertia, straight, swivel head, universal and close-coupled types . . . in a wide range of sizes and in light, standard and heavy duty pressure ratings.

Coupled with this range of holders Mallory offers you scores of different shapes of welding electrodes . . . an unlimited number of combinations from which to choose. You'll save both the cost and the time of designing and producing special types . . . and you'll profit, too, by improved performance that is the result of Mallory's quarter century of experience in resistance welding alloys and materials.

Our Resistance Welding Catalog lists the complete line of Mallory electrodes, holders, dies, castings and forgings. Ask your local distributor for a copy, or write to Mallory today.

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry Street, Toronto 15, Ontario

Expect More... Get More from

P.R. MALLORY & CO. Inc.
MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

STOCK ELECTRODES

Hundreds of shapes and sizes are available in stock . . . with round water holes or the exclusive Mallory fluted cooling hole for longer life between dressings. Save you both cost and delivery time.

STANDARD ELECTRODES

Odd-shaped electrodes you consider "specials" may well be standard items for Mallory . . . can be made quickly with existing tools, in a wide range of single-bend, double-bend and irregular shapes.

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

HEAT TREATING BOOSTS PRODUCT PREFERENCE

Sales Up 300%

...increase credited to ALLIS-CHALMERS INDUCTION HEATING

JAMBOR Tool & Stamping Co.
Milwaukee 10, Wisconsin, U. S. A.
BULL DOG AUTOMOTIVE PRODUCTS

Allis-Chalmers Mfg. Co.
Box 501
Milwaukee 1, Wisconsin

Attention: Mr. Ottmar W. Noeske,
Induction Heating Section

Gentlemen:

For eighteen years we used a special low carbon steel in our king bolts. The great wearing qualities of this steel make heat treating unnecessary. However, even though it will outlast any treated steel, it is file soft.

Naturally, our competitors made an issue of this fact.

To remedy the situation we decided to use a higher carbon content steel and treat our king bolts with the most advanced equipment on the market -- an Allis-Chalmers Electronic Induction Heater.

Since this heater's installation eight months ago, increased preference for our king bolts has been amazing. Sales are up 300%! In addition, we've cut material costs by 10%.

We know this is the type of success story you like to hear and, of course, we're happy to be able to say it happened to us.

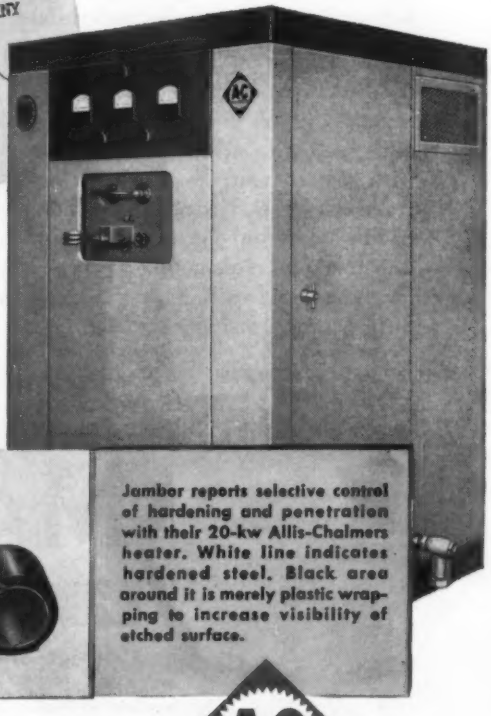
Yours truly,

JAMBOR TOOL & STAMPING COMPANY

E. L. Pressinger

E. L. Pressinger,
Vice president

ELP:cz



Jambor reports selective control of hardening and penetration with their 20-kw Allis-Chalmers heater. White line indicates hardened steel. Black area around it is merely plastic wrapping to increase visibility of etched surface.

If your production involves hardening, soldering, annealing, brazing and/or heating — find out about Allis-Chalmers induction heating. See how you can increase preference for your products, boost output, decrease costs and cut rejects.

Get productive flexibility, too. Setting up these heaters to handle various jobs is merely a matter of changing a single coil. You can handle small, odd-lot work with almost as much efficiency as long production runs.

For all the facts, contact your nearest A-C District Office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4501

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

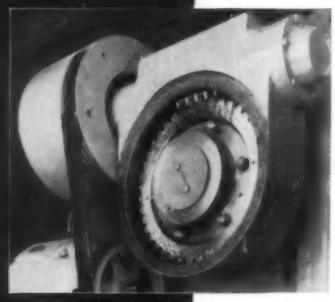
"Yep, Biggest Stock in Town!"

That's what most GREENFIELD Distributors can boast when you ask about threading tools and gages. In fact, chances are that a GREENFIELD Distributor is *The Cutting Tool Center* in your trading area. His knowledge of local demand and of suppliers, his stocks on hand, his ability to give service, all are yours when you buy through a distributor.

GREENFIELD TAP and DIE CORPORATION
Greenfield, Massachusetts

Buy taps from DISTRIBUTORS . . . from GREENFIELD DISTRIBUTORS

Columbia
power squaring shear features



long-life gear train

Columbia's gear train is especially designed to provide maximum life with minimum maintenance.

The following features all combine to assure long life:

- **Special alloys**
- **Bearings designed for this particular application**
- **Gears in operation only during cutting cycle**
- **Provision to reposition the worm wheel for even distribution of wear**

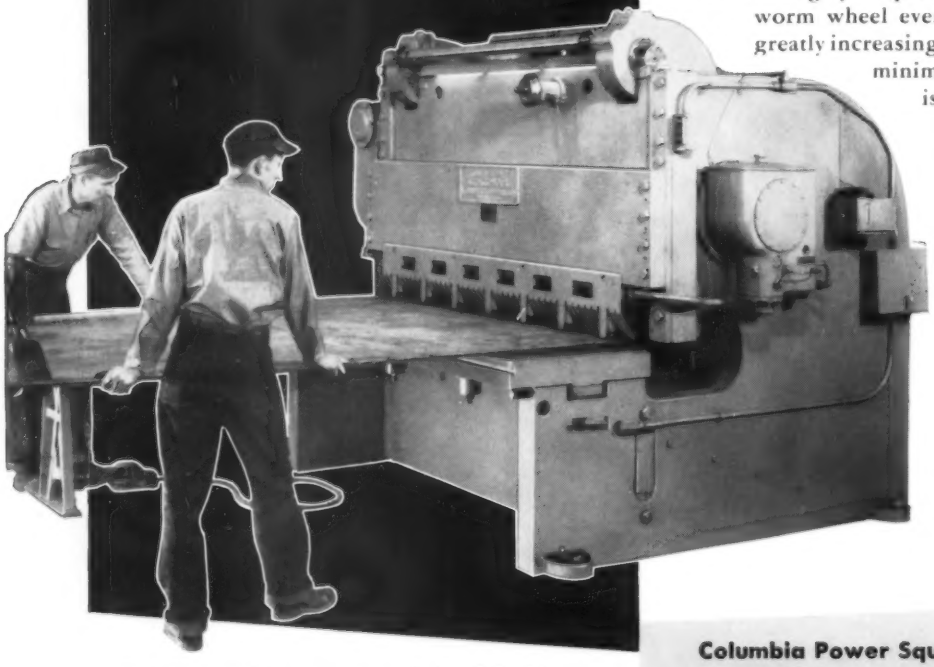
THIS COLUMBIA GEAR TRAIN ASSURES

....a SMOOTHER CUT
....a LONGER LIFE

The unusual conditions under which power is applied to a shear demand more than usual knowledge of the stresses developed in this service. From more than 100 years of experience in building heavy metalworking equipment, Columbia engineers and designers have evolved a gear train of exceptional life and capacity.

The worm shaft is of heat-treated alloy steel, supported by extra heavy duty anti-friction bearings. A specially cut high tensile alloy bronze worm gear keyed to the eccentric shaft provides smooth power to the shear ram. Since the bronze worm gear teeth are under load for only 180 degrees of each cutting cycle, periodic repositioning of the worm wheel evenly distributes the wear, greatly increasing gear train life. To further minimize wear, the gear train is inoperative except during the actual cutting cycle.

Check these and other Columbia Shear features. You get more service . . . better service . . . from every Columbia Shear.



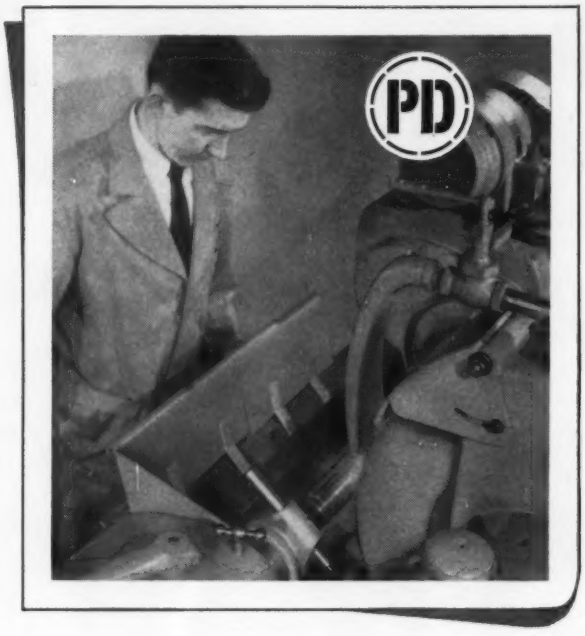
Columbia Power Squaring Shear
Model 0806, ½" x 6'

Get the complete story on exclusive Columbia Shears. Write for new FREE Bulletin No. PS-4 and the name of your distributor.

COLUMBIA DIVISION THE **Lodge & Shipley** CO. **HAMILTON 2, OHIO**

A manufacturing achievement that can save you money

Just as a NEGATIVE guarantees you an exact duplication of a photograph each and every time, you are always assured a . . .



. . . POSITIVE DUPLICATION of an original grinding wheel each and every time through the CINCINNATI (PD) Manufacturing Process.

NOW!

Cincinnati Grinding Wheels offer

PD

Positive Duplication

If your plant uses grinding wheels, then you'll certainly want to investigate Positive Duplication without delay. For here is an outstanding development in precision manufacturing and quality control that *can save you money* . . . and *increase your production!*

Through the CINCINNATI (PD) Manufacturing Process you are assured a Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

We'll be happy to prove to you how CINCINNATI (PD) WHEELS can save you money and increase your production. Just contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

LOOK TO THIS NEW, PRODUCTION-BOOSTING LINE

50 THROUGH 300-TON CAPACITIES

NIAGARA MACHINE & TOOL WORKS 1879 75 1954

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

For a realistic answer to the metal stamping and forming problems of today... and tomorrow

DESIGN MODERNIZATION CONCEALS DRIVING MECHANISM

Fully streamlined, enclosed construction, front and back, provides pronounced advantages. There are no exposed, overhanging flywheel, clutch, brake, intermediate shaft, nor motor in rear of press to obstruct crane service, block light, throw grease and consume floor space unnecessarily ... yet all parts are quickly accessible.

WORK-SAVING FLEXIBILITY MEETS SHIFTING PRODUCTION NEEDS

Box type welded steel slides are power adjusted through self-locking, worm driven, barrel type connections to accommodate a wide range of die heights and to permit quicker, easier and safer die setting. Niagara electric clutch control provides trouble-free push button operation and a five-position selector switch for ease, safety and efficiency in single stroking, continuous running, jogging, reverse jogging and slide adjustment.

RUGGED, HEAVY DUTY FRAMES PROLONG DIE LIFE

All-steel, rigidly constructed frames, featuring an exclusive triple box section design, provide maximum resistance to deflection from horizontal, diagonal and torsional stresses. Greater accuracy and longer die life are thereby assured.

GREAT SHUT HEIGHT AND LONG SLIDE ADJUSTMENT

Unusually liberal shut height and extremely long slide adjustment, of both one and four-piece frame construction, permit use of a tremendous range of stamping and forming dies.

Hailed as the most progressive step in straight side, double crank press history, the new Niagara SC-2 Press Series could only have originated from a keen insight of today's metal working problems and the more challenging ones of tomorrow. In every detail of design, you'll recognize the unduplicated competence of Niagara engineers. Who else would be more mindful of press users' needs than the men who design and build America's leading and most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work?

CHECK THE FEATURE-BY-FEATURE EVIDENCE

Preview this complete new line of straight side presses at once. Find out what they can do for you. Write for Niagara's new, illustrated Bulletin 64-H today.

NIAGARA MACHINE & TOOL WORKS

BUFFALO 11, N. Y.

DISTRICT OFFICES:

Detroit • Cleveland • New York • Philadelphia

Dealers in principal U. S. cities and major foreign countries

NIAGARA

STRAIGHT SIDE DOUBLE CRANK PRESSES

the ONE COMPLETE Tool Line

BLOCK-TYPE GENERAL PURPOSE BARS
PRECISION LINE BORING BARS
SUPER MICROMETER ADJUSTABLE FLYCUTTER TOOLS
SUPER MICROMETER ADJUSTABLE TOOLS WITH UNFINISHED SHANKS
L-TYPE MICROMETER EXPANSION BORING TOOLS
CLAMPED-ON CARBIDE TIP PLANER TOOLS
QUICK-CHANGE AND MORSE TAPER ARBORS AND SLEEVES
DAVIS
INTERCHANGEABLE BLOCK-TYPE TOOLING
MICROMETER EXTENSION AND THREE-AND-ONE BORING HEADS
SUPER MICROMETER ADJUSTABLE STUB BORING TOOL SETS

You Can't Afford to Miss at the A. S. T. E. Western Industrial Exposition

Yes, for the best answer to every tooling need, Davis is the one line you'll want to inspect with care. It offers you unrestricted selection from the broadest standard line of boring, turning and planing tools . . . plus the most advanced and efficient special-engineered tooling designs produced in the industry.

DAVIS

BORING TOOL DIVISION OF
Giddings & Lewis Machine Tool Company
Fond du Lac, Wisconsin

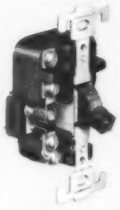
Booth 454 SHRINE AUDITORIUM AND EXPOSITION HALL

THE ONE NAME THAT CERTIFIES ULTIMATE PRECISION AND PRODUCTIVITY IN TOOLING

WHAT ALLEN-BRADLEY

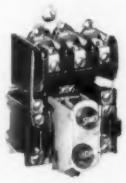
has to offer in manual and automatic motor controls as components for special control panels...

Fhp Starters



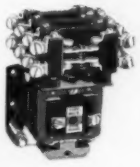
For motors of 1 hp or less. Provide dependable overload protection.

Manual Starters



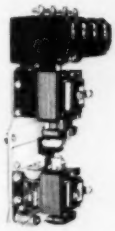
For a-c motors up to 5 hp, 220 v; 7½ hp, 440-550 v. Overload breakers.

Universal Relays



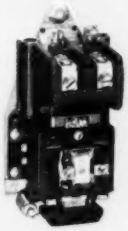
Up to 8 poles N.O. or N.C. contacts. Have double break, silver contacts.

Hum-free



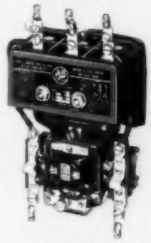
A magnetic latch keeps the contactor closed without using any coil current.

Contactors



Available in 8 sizes up to 900 amp. Solenoid operated silver alloy contacts.

Starters



Solenoid starters in 8 sizes up to 300 hp, 220 v; 600 hp, 440-550 v.

Oiltight Accessories

Mushroom Push Button

Selector Switch

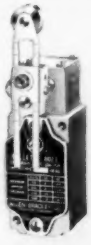
Control Station

Pilot Lights

Drum Switches

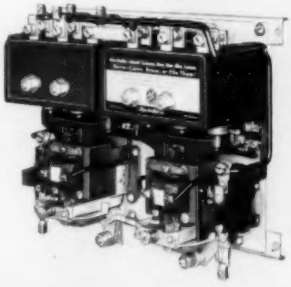
For reversing, transfer, or pilot duty.

Limit Switches



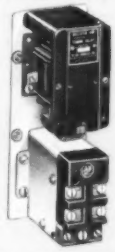
Oiltight. Wide variety of operating levers available.

Reversing Starters

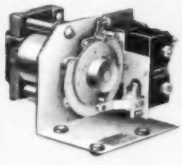


Two interlocked solenoid starters with dependable solder pot overload relays.

Pneumatic and Motor-driven Timers

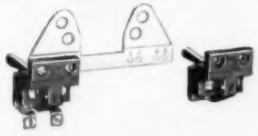


Has pneumatic bellows for timing from ⅛ to 180 sec.



Motor driven timer for laundry or other reversing service. Can be set for 2, 3, 4, or 6 motor reversals per minute.

Auxiliary Contacts



Handy auxiliary contacts which can be attached to Allen-Bradley Sizes 0 to 3 starters. Mounted quickly on the arc hood without disturbing wiring. Easily changed from N. O. to N. C. contacts or vice versa.

Terminal Blocks

Two sizes—15 & 25 amp. Interlock to form terminal strips of any length. Marking strip identifies circuits.

Send for bulletins on above components.
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

A-B Quality

ALLEN-BRADLEY

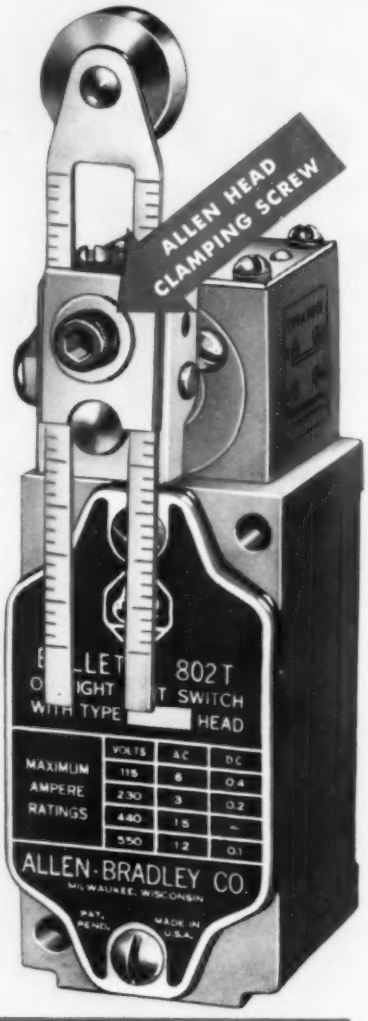
QUALITY

TROUBLE FREE MOTOR CONTROLS

4-55-R

NEW!

OILTIGHT LIMIT SWITCH
WITH ADJUSTABLE OPERATING LEVER



Another handy unit has been added to the broad line of Allen-Bradley oiltight limit switches... the NEW Type 802TG limit switch. The operating lever is adjustable from ¾ inch to 3 inches in radius.

The lever can be set at any angle on the shaft, and the operating head can be placed in any one of four positions—0—90—180—270 degrees on the body of the switch.

Like all Bulletin 802T limit switches shown here, the new unit has a snap action switch with double break, silver contacts. There is one normally open and one normally closed contact... electrically separated and protected by an oiltight seal. Terminals are easily accessible.

Roller Lever Maintained Contact

Flush Plate for Mounting Limit Switch in Cavity

Roller Lever Spring Return

Send for this 8-Page Bulletin

Bulletin 802T is a handy selection guide for picking the limit switch best adapted to your needs. Write for your copy, today.

ALLEN-BRADLEY
QUALITY
LIMIT SWITCHES

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

Fork Lever Maintained Contact

Flush Mounted Fork Lever

Rod Type Spring Return

Top Push Rod Spring Return

Push Roller Spring Return

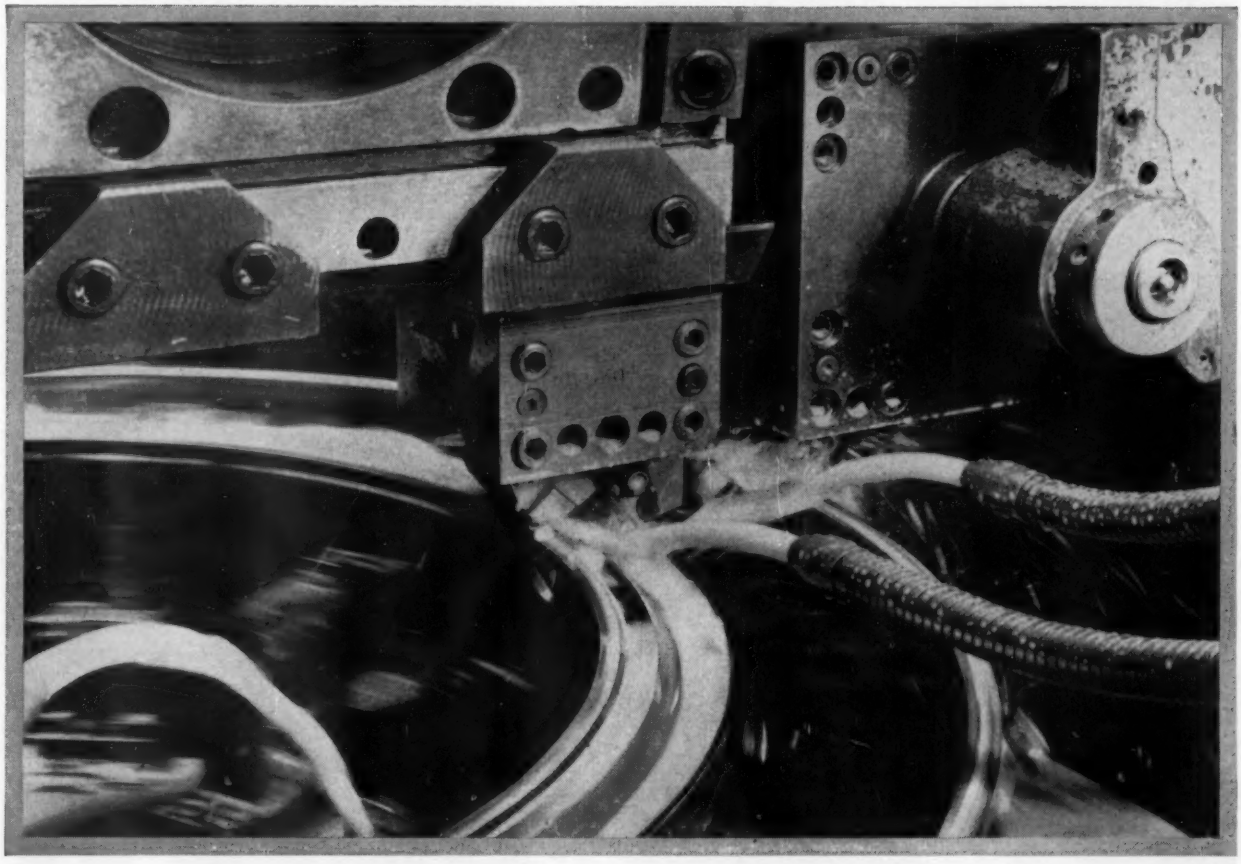
Side Push Rod Spring Return

Side Push Rod Maintained Contact

4-55-MR

Industry-wide records
prove that . . . as compared with other
steel-cutting carbides . . .

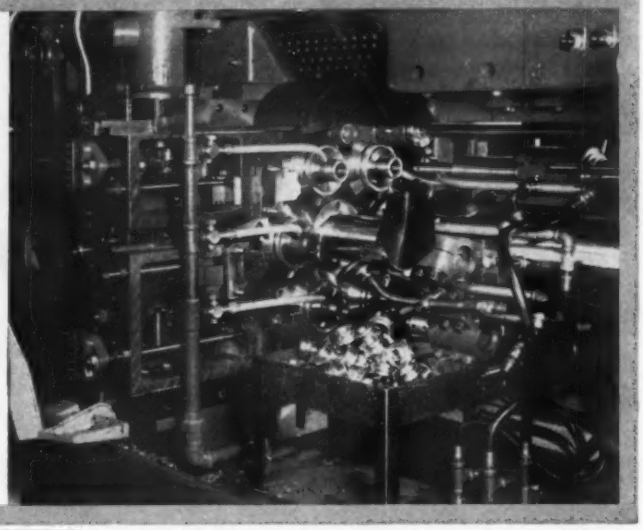
Carboloy® Grades 350, 370 carbides increase production as much as 3⅔ times



BEFORE CARBOLOY GRADE 370, 17 other carbides were tried by the Jet Division, Thompson Products, Inc., for facing 310 stainless-steel jet-engine compressor frames. The best any carbide could do was 3 pieces per 8-hour shift. With Grade 370, production jumped to 14 pieces. Tool life was doubled; tool inventory was lowered. Downtime losses were cut because Grade 370 inserts machined almost 3 times as many pieces per grind.

SETUP: Material—310 Stainless steel. **Speed**—340 SFPM. **Feed**—0.008 inch. **Depth of cut**—0.100 inch at 36 rpm. **Coolant**—Yes.

For other reports of new production and efficiency records set with Series 300 carbides, see the following pages.

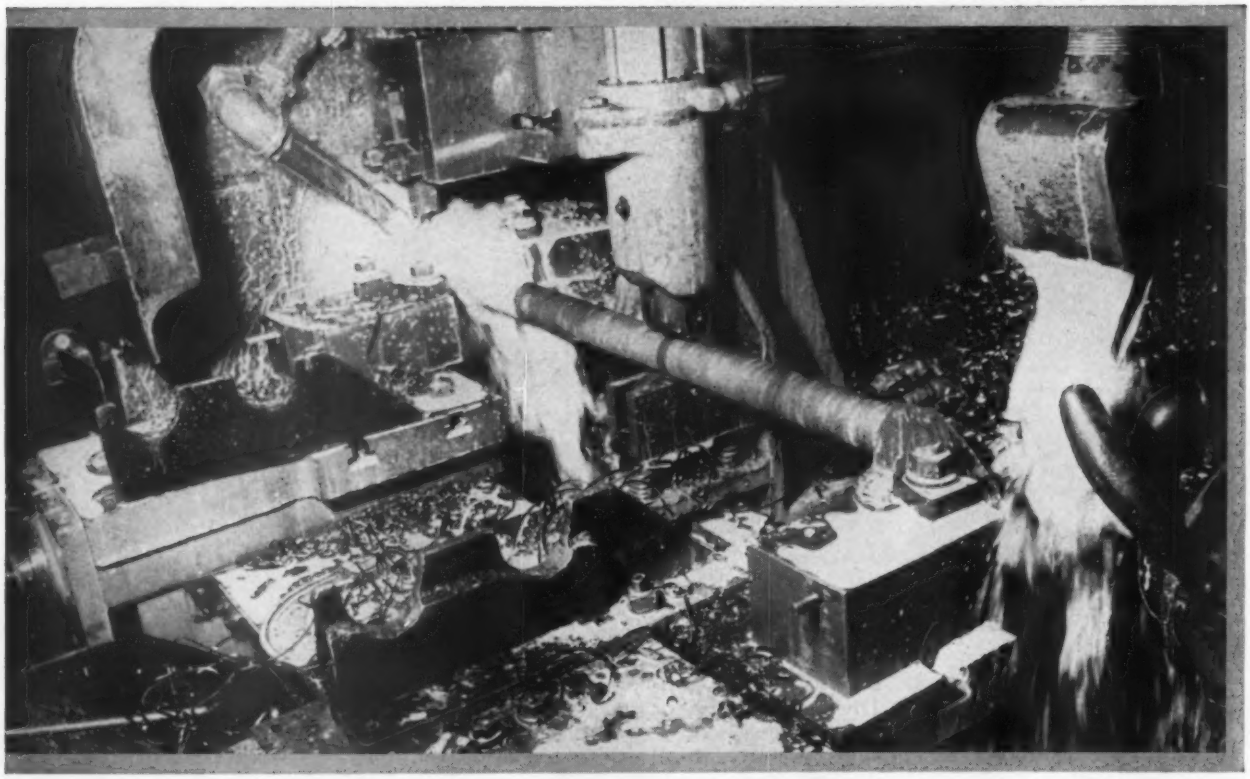


PRODUCTION TIME WAS CUT IN HALF when Grade 370-equipped tools were installed in this Cone 6-spindle bar automatic. Seven Grade 370 tools did the job of fourteen high-speed steel tools for machining inner bearing races.

SETUP: Material—SAE 52100 steel tubing. **Speed**—333 SFPM. **Coolant**—Yes.

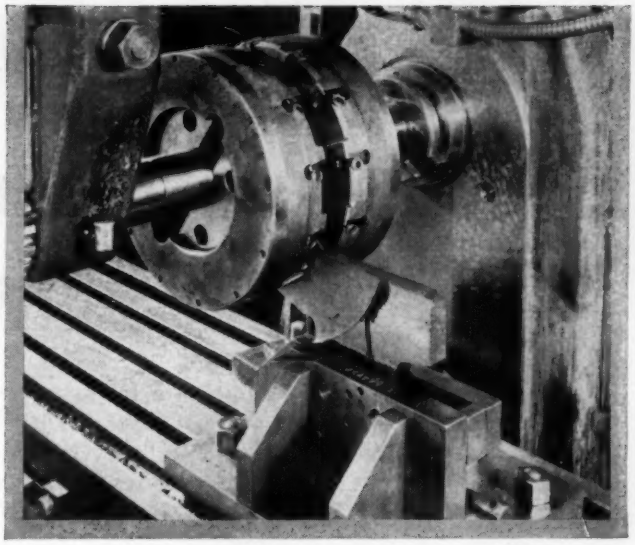
Case-history proof of how . . .

New Carboloy Steel-cutting



PRODUCTION WAS INCREASED more than 33% when Carboloy Grade 350 tools were used to turn this AISI 4150 48" truck axle forging. Grade 350 machines front and back ends simultaneously; eliminates chipping and flaking encountered with other carbides.

SETUP: Material—AISI 4150 steel forging. **Speeds**—200 SFPM on 2-inch dia.; 400 SFPM on 4-inch dia. **Feeds**—0.014 inch. **Depth of cut**—1/16 to 1/8 inch. **Coolant**—Yes.



SWITCHING TO GRADE 370 inserts, for straddle milling this forging, enabled Robert H. Brooks Co. to go from almost no production to completely satisfactory production. Grade 370 held tolerances to the required thousandths on this jet fighter wing fitting; produced so fine a finish that it is impossible to determine the blend line after plating.

SETUP: Material—SAE 4140 forging, heat-treated between 40 to 43 Rockwell C. **Speed**—650 SFPM. **Feed**—0.0025 inch per tooth. **Depths**—0.062 inch and 0.083 inch. **Coolant**—Yes.

Grades outcut, outlast all other carbides

Here's why Series 300 carbides will immediately bring you increased production and greater operating efficiency:

1. Grades 350 and 370 have been designed for you to get the most out of your machine tools. They can operate without tip deformation at higher speeds and faster feeds than other carbides. This built-in production ability lets you take full advantage of your equipment.
2. Grades 350 and 370, proved by in-plant records, give more production per grind, more grinds per tool, more production per shift. In short, in hundreds of operations similar to those on these pages, they have outperformed other carbides in every respect.

Carboloy Series 300 carbides are made by a new carefully controlled process. This process gives Series 300 a built-in structural rigidity, which enables them to operate at temperatures as high as 1800° F. . . temperatures that cause cutting-edge deformation in other carbides.

You can get Carboloy cutting tools, boring tools, inserts and blanks of Grades 350 and 370 in a wide range of styles and sizes. Your Authorized Carboloy Distributor can fill your orders immediately. For the new Series 300 price list GT-305, send coupon on the next page, today.

Carboloy Created-Metals for Industrial Progress

Your Authorized Carboloy Distributor
can meet your steel-cutting needs from his...

New, enlarged line of Series 300 tools and blanks

With the addition of 117 new sizes of standard tools and blanks, your local Authorized Carboloy Distributor can now give you immediate delivery on practically every Grade 350 and 370 tool and blank you need. Many other sizes and styles are available nonstock from the Carboloy plant in Detroit.

Carbides for cutting all materials

In addition to the Series 300 carbides, complete stocks of Carboloy tools and blanks are available in various grades, for machining all materials—ferrous or nonferrous, metallic or nonmetallic.

The following standard-grade items have also been recently added to the standard line:

- 20 sizes of Grades 883 and 44A style 0000 blanks for heavy-duty cast-iron and nonferrous cutting.
- Throwaway-type blanks.
- Grade 883 style F and G offset turning tools in ½ and ⅝ inch sizes.
- Offset threading tools.

For price lists and specifications on Series 300 carbides and standard grades, send coupon today.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

MANUFACTURERS OF CEMENTED CARBIDES, PERMANENT MAGNETS, THERMISTORS, HEVIMET, AND VACUUM-MELTED METALS

CARBOLOY
Department of General Electric Company
11149 E. 8 Mile Road. Detroit 32, Michigan

☐ Send Brief-a-Log GT-305, containing price list and specifications on Grades 350 and 370.

☐ Send Brief-a-Log GT-285, containing price list and specifications on standard grades.

Name_____ Title_____
Company_____
Address_____
City _____ Zone___ State_____

AUTHORIZED CARBOLOY CEMENTED CARBIDE DISTRIBUTORS

See the Yellow Pages

. . . for the name of your local Authorized Carboloy Distributor. You'll find his name under the Carboloy trademark listing in classifications: TOOLS or TOOLMAKERS.

CLEEREMAN DRILLING MACHINES

LOWEST Operating Costs!

Why?

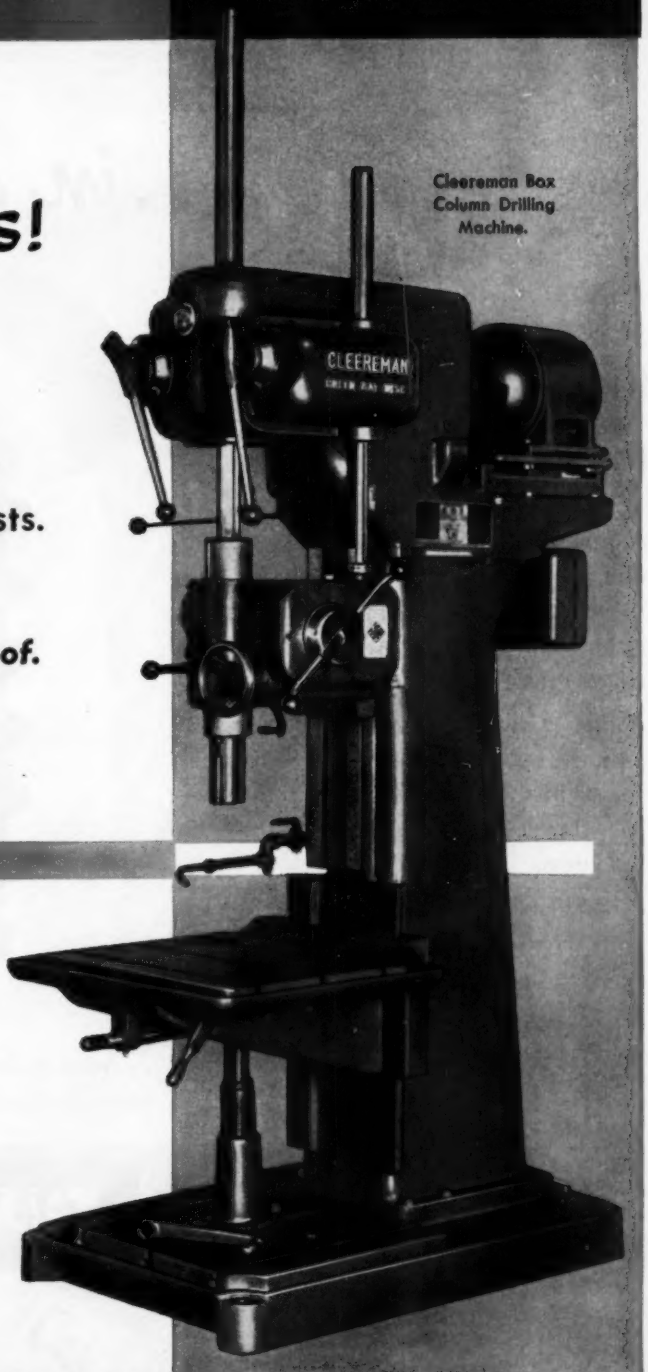
1—Eliminate Down Time.

2—More Power to Produce.

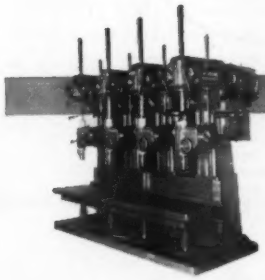
3—Lowest Maintenance Costs.

4—Less Operator Fatigue.

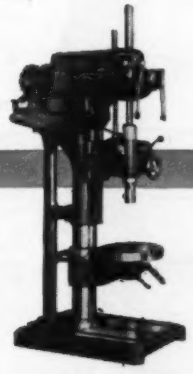
Go to any Cleereman user for proof.



Cleereman Box Column Drilling Machine.



Cleereman Multiple Drilling Machine.



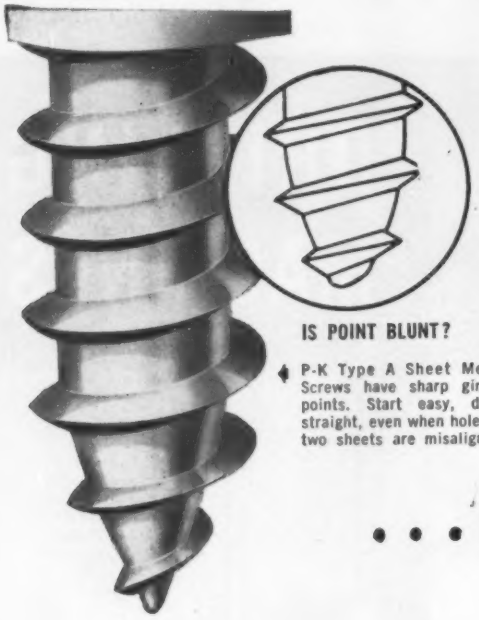
Cleereman Round Column Drilling Machine.

BRYANT Machinery & Engineering Company

General Office
640 West Washington Blvd., Chicago 6
Representatives in Principal Cities

CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES



IS POINT BLUNT?

P-K Type A Sheet Metal Screws have sharp gimlet points. Start easy, drive straight, even when holes in two sheets are misaligned.

$0.15 .015 ... in assembly savings

the **POINT** makes the difference

A properly planned saving of 15 cents per unit can fade to 1½ cents — or nothing — on the assembly line . . . unless the screws you use have the good points that assure quick starting and straight driving.

Bad points are hard to detect in the package, but your cost sheets and customer complaints will soon show their effects — job slowdown, parts spoilage, hidden weakness.

That's why P-K quality standards have been set so high — to make sure you get P-K Self-tapping Screws that are not only *pointed for savings*, but headed, threaded, and heat-treated with one purpose, to keep your assembly lines trouble-free.

Start making *planned* assembly savings pay off . . . talk to a P-K Assembly Engineer. Parker-Kalon Division, General American Transportation Corporation, 200 Varick St., New York 14.

DOUBLE LEAD THREADS?

P-K Type Z Self-tapping Screws have well defined taper. Screw stands erect in hole and double lead thread means quick, easy starting; forms secure mating threads.

PARKER-KALON®

IN STOCK . . . see your nearby P-K Distributor . . .

HOW MANY FLUTES?

P-K Type F Screws have five thread cutting flutes; easier to start, less torque to drive, cut clean threads all the way in.

per unit

P-K STANDARDS
make sure you get
SCREWS POINTED FOR SAVINGS

P-K design and quality standards protect you against the bad points shown and many others that will slow down assembly and cause parts damage. They don't "get by" P-K Inspectors — that's why *all* P-K Self-tapping Screws can be "Guaranteed First Quality."

IS PILOT TOO SHORT?

Pilots of P-K Type U Drive Screws are proper size and length to permit screws to start straight, drive straight.

The First originated by P-K . . . and First today . . . the leading choice for fastening economy

SELF-TAPPING SCREWS

your local Supply and Service Specialist

The MEEHANITE® Casting Reporter

FLAME HARDENED MEEHANITE DIES PRODUCE JET ENGINE PARTS

Cockshutt Aircraft Limited, Renfrew, Ontario, manufacturers of jet engine components, have found the use of flame hardened Meehanite dies are the all-'round answer to better performance in service in the production of pressed parts and a superior finished product.

Flame hardening set-up for hardening Meehanite dies prior to chrome plating.

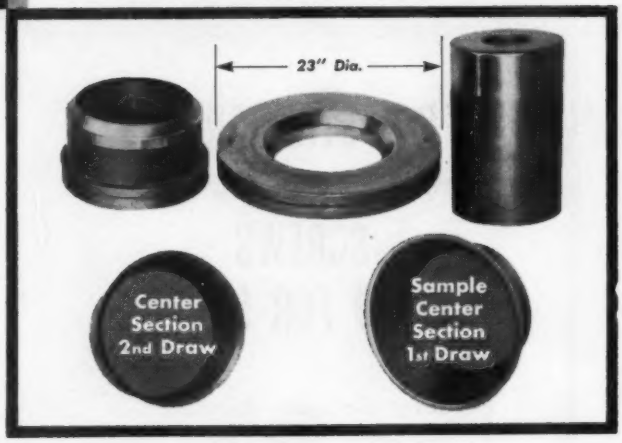
Meehanite punch-draw and pressure rings; chrome-plated for second draw on 600-ton Dominion Hydraulic Press. Flame tube center section.

Builder says:

"In producing parts for jet engine combustion systems, we have found that flame hardened Meehanite metal dies are far superior to those made from ordinary gray iron castings when used on hydraulic or mechanical presses.

The rings and punches made from flame hardened Meehanite metal for use on our Cincinnati Hydroform Presses are equal in performance to those made from far more costly materials.

For further improvement and to avoid scores and scratches during drawing operations, it is found beneficial to hard chrome plate the work surfaces of the die, but it is important that the die is hardened before plating to reduce peeling or chipping of the chrome to a minimum."



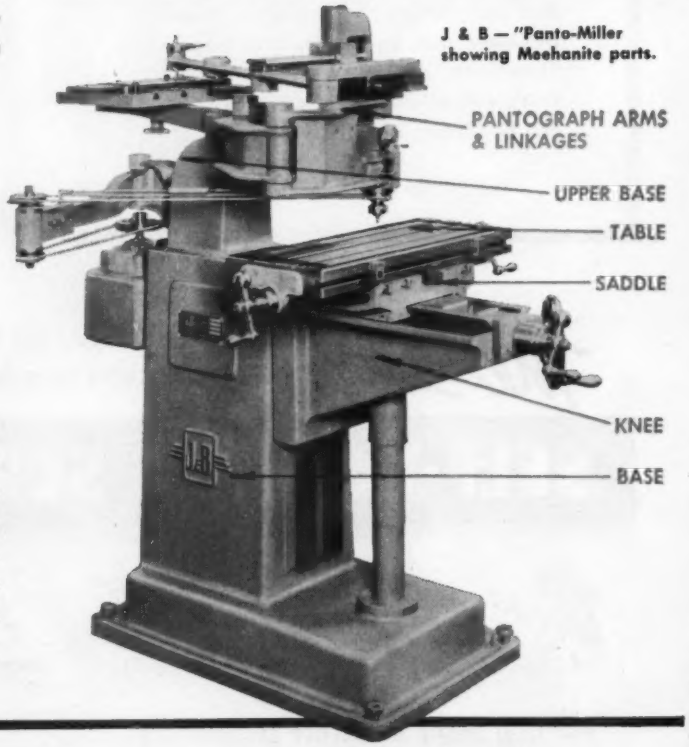
J&B "PANTO-MILLER"

Another Precision Tool Specifying Meehanite Components

Johnson & Bassett, Inc., Worcester, Massachusetts, build a 2-dimensional pantograph engraver known as the "Panto-Miller". Designed for versatility, precision and efficient production, this unit incorporates Meehanite castings for all major, vital parts.

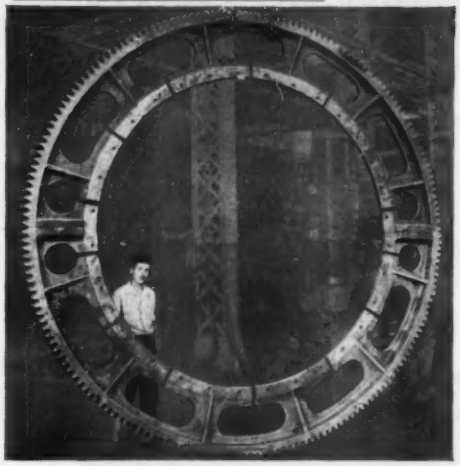
Builder says:

"Our use of Meehanite castings in general is due to the excellent machinability, tensile strength and rigidity. It is important to our Panto-Miller that we have these three features, plus the important feature of vibration absorption. Our machine is a duplicating machine and, of course, must be extremely accurate and we require the best materials available as insurance against blow holes, distortion, etc."



J & B — "Panto-Miller showing Meehanite parts.

Industries report what Meehanite Castings have done for them



Meehanite drive gear.

RUGGED HARDINGE GRINDING MILLS BUILT WITH MEEHANITE CASTINGS

The name "Hardinge" has long been famous in those fields where the grinding or pulverizing of all types of materials is a basic requirement. As manufacturers of the highly successful Conical Grinding Mill, the Hardinge Manufacturing Company, York, Pennsylvania, materials specifications call for maximum properties and service life and Meehanite castings are used for important basic components. These include:

1. Mill Shell • 2. Trunnions • 3. Gear Ring and Gear • Main Bearings

Builder says: "We undertook the manufacture of Meehanite castings in our foundry some years ago, not only as a means of improving foundry efficiency and quality of castings, but in order to produce cast components such as these which will provide maximum wear resistance, high strength and toughness and the uniformity of these properties which enables us to assure our customers that they are buying a *better* product when they buy from Hardinge."

Meehanite grinding mill shell.

Mill bearings are Meehanite castings.

ONLY A MEEHANITE FOUNDRY CAN MAKE MEEHANITE CASTINGS

The American Laundry Machinery Co.	Rochester, New York
Atlas Foundry Co.	Detroit, Michigan
Banner Iron Works	St. Louis, Missouri
Barnett Foundry & Machine Co.	Irvington and Dover, New Jersey
E. W. Bliss Co.	Hastings, Mich. and Toledo, O.
Builders Iron Foundry	Providence, Rhode Island
Compton Foundry	Compton, Calif.
Continental Gin Co.	Birmingham, Alabama
The Cooper-Bessemer Corp.	Mt. Vernon, Ohio & Grove City, Pa.
Crawford & Doherty Foundry Co.	Portland, Oregon
DeLaval Steam Turbine Co	Trenton, New Jersey
M. H. Detrick Co.	Newark, N. J. and Peoria, Ill.
Empire Pattern & Foundry Co.	Tulsa, Oklahoma
Farrel-Birmingham Co., Inc.	Ansonia, Connecticut
Florence Pipe Foundry & Machine Co.	Florence, New Jersey
Fulton Foundry & Machine Co., Inc.	Cleveland, Ohio
General Foundry & Manufacturing Co.	Flint, Michigan
Georgia Iron Works Co.	Augusta, Ga.
Greenlee Foundry Co.	Chicago, Illinois
The Hamilton Foundry & Machine Co.	Hamilton, Ohio
Hardinge Company, Inc.	New York, New York
Hardinge Manufacturing Co.	York, Pennsylvania
Johnstone Foundries, Inc.	Grove City, Pennsylvania
Koehring Co.	Milwaukee, Wisconsin
Lincoln Foundry Corp.	Los Angeles, California
Palmyra Foundry Co., Inc.	Palmyra, New Jersey
The Henry Perkins Co.	Bridgewater, Massachusetts
Pohlman Foundry Co., Inc.	Buffalo, New York
Rosedale Foundry & Machine Co.	Pittsburgh, Pennsylvania
Ross-Meehan Foundries	Chattanooga, Tennessee
Shenango-Penn Mold Co.	Dover, Ohio
Sonith Industries, Inc.	Indianapolis, Ind.
Standard Foundry Co.	Worcester, Massachusetts
The Stearns-Roger Manufacturing Co.	Denver, Colorado
Traylor Engineering & Mfg. Co.	Allentown, Pennsylvania
Valley Iron Works, Inc.	St. Paul, Minnesota
Vulcan Foundry Company	Oakland, California
Washington Iron Works	Seattle, Washington

CANADA

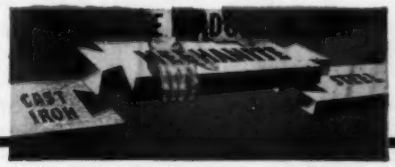
Hartley Foundry Division— London Concrete Machinery Co., Ltd.	Brantford, Ontario
E. Long Ltd.	Orillia, Ontario
Otis Elevator Co., Ltd.	Hamilton, Ontario

Write for your copy of **"The Handbook of Meehanite Metals"**

This Advertisement Sponsored by Foundries listed above

MEEHANITE METAL® CORP.

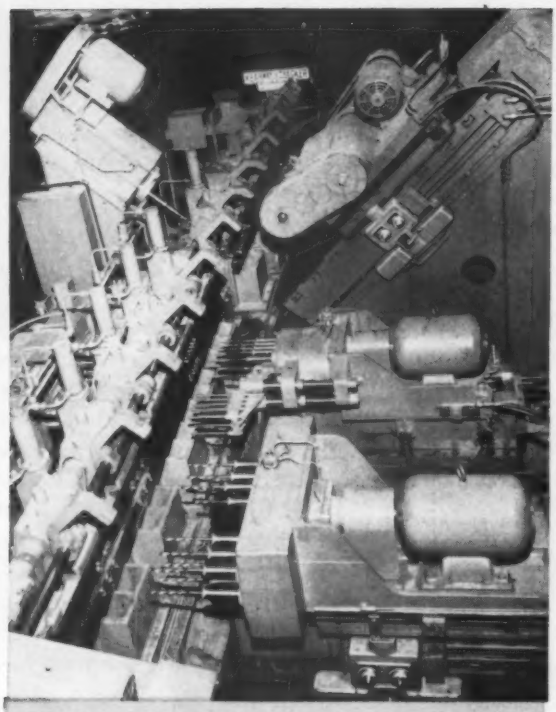
714 North Ave., New Rochelle, N. Y.



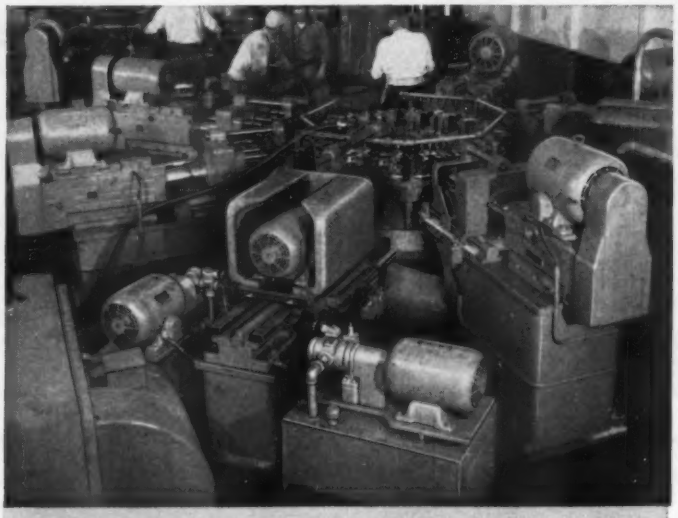
VICKERS® HYDRAULICS Helps Cut Costs at PACKARD . . . *on Wide Variety of Jobs in New V-8 Engine Plant*

Representative of the many and varied production machines equipped with Vickers Hydraulics in the new Packard V-8 Engine Plant at Utica, Michigan are those shown here. Among the advantages of Vickers Hydraulics are: (1) simplification of design, (2) adaptable to automation, (3) ease of providing interlocks and overload protection, (4) ease of maintenance with minimum down time. Equally important, Vickers Hydraulics gives you the benefits of a nation-wide and full-time field engineering and service organization.

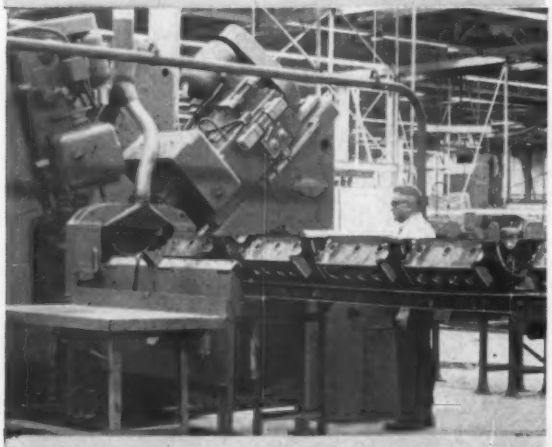
The Vickers Application Engineer near you will be glad to show you the benefits you can obtain by using Vickers Hydraulics. Write for a copy of Bulletin 5002.



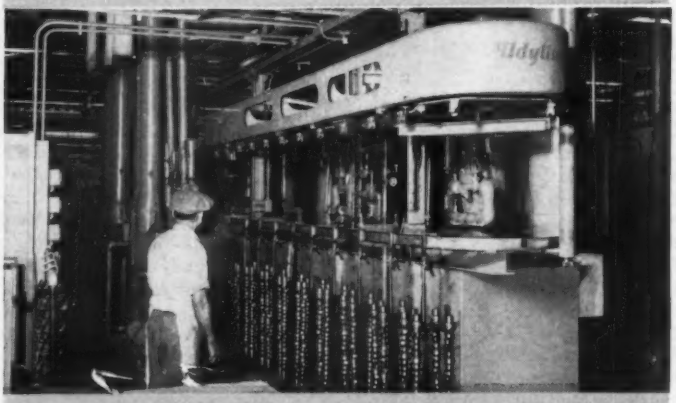
Kearney & Trecker machine for drilling and counterboring bearing caps. Note Vickers Traverse and Feed Cycle Control Panels visible on two heads; advantages include smooth and constant feed rates, easy adjustability, compactness and simplified installation.



Michigan Drill Head Co. 8 station dial machine for connecting rods and caps. Vickers Hydraulic Power Units shown are complete hydraulic "packages" (pump, electric motor, valves, oil reservoir, filter, etc.) that simplify design, and save installation and maintenance costs.



Three Greenlee Transfer Machines in automatized cylinder block line use Vickers Hydraulics. Compact Vickers Traverse and Feed Cycle Control Panel shown on head assures smooth and constant feed rate regardless of fluctuations in tool resistance or changes in hydraulic pressure or volume.



Udylite Automatic Processing Machine saves space and assures more uniform quality by using Vickers Hydraulics to raise, lower and transfer cam shafts through cleaning, coating and rinsing baths in "Lubriting" process.

7109

VICKERS Incorporated

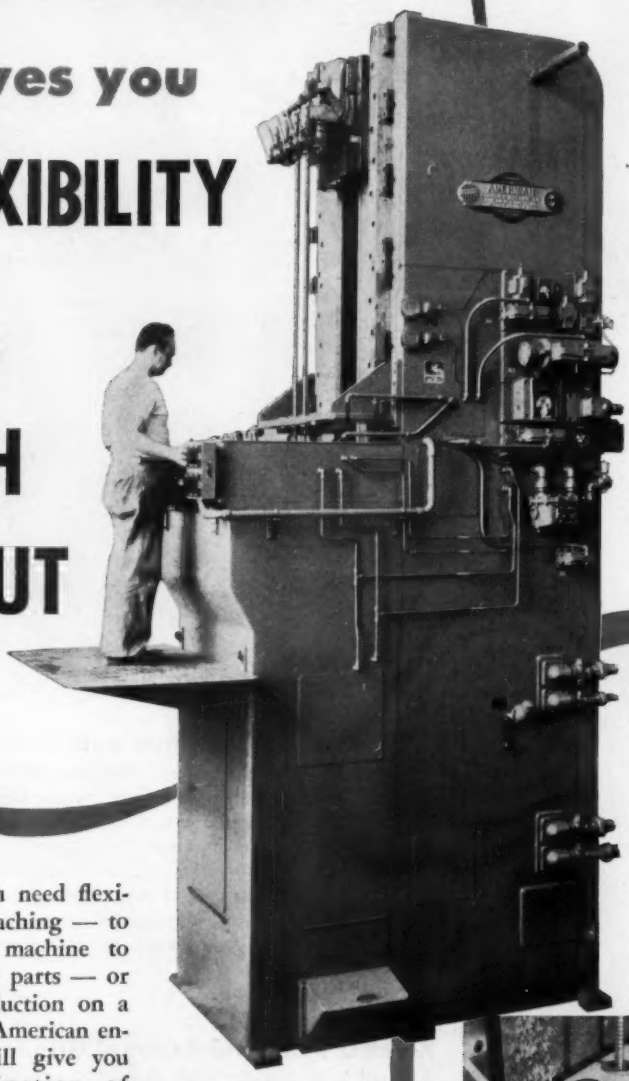
DIVISION OF THE SPERRY CORPORATION

1410 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices: • ATLANTA • CHICAGO AREA (Brookfield) • CINCINNATI • CLEVELAND • DETROIT • HOUSTON LOS ANGELES AREA (El Segundo) • MINNEAPOLIS • NEW YORK AREA (Summit, N. J.) • PHILADELPHIA AREA (Media) • PITTSBURGH AREA (Mt. Lebanon) • ROCHESTER • ROCKFORD • SAN FRANCISCO AREA (Berkeley) • SEATTLE • ST. LOUIS • TULSA WASHINGTON • WORCESTER

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

American BROACHING gives you FLEXIBILITY plus HIGH OUTPUT

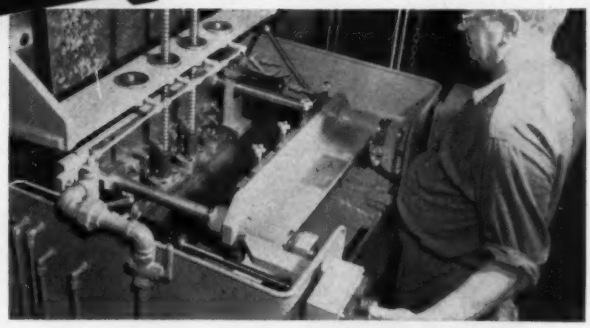


ANOTHER American FIRST

- 30 different universal joint yokes broached on one machine
- Broaching strokes from 48″ to 72″ used to broach parts
- Variable speeds — 35 to 45 second cycle
- Two or four station operation
- Combination round and spline broaches
- Up to 400 parts per hour

Operator loads parts in work nest and swings down forked locating leafs to maintain radial location. Transfer slide, push button actuated, automatically shuttles parts into broaching position. While internal splines are being broached, slide moves back for reloading. At end of broaching stroke, parts are automatically ejected.

Whether you need flexibility in broaching — to enable one machine to handle many parts — or volume production on a single part, American engineering will give you the combination of broaching machine, fixtures and broaches that will assure you maximum high output. To get American's recommendations, write today giving details of your broaching requirements — or ask for new Catalog 450.



AMERICAN

American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

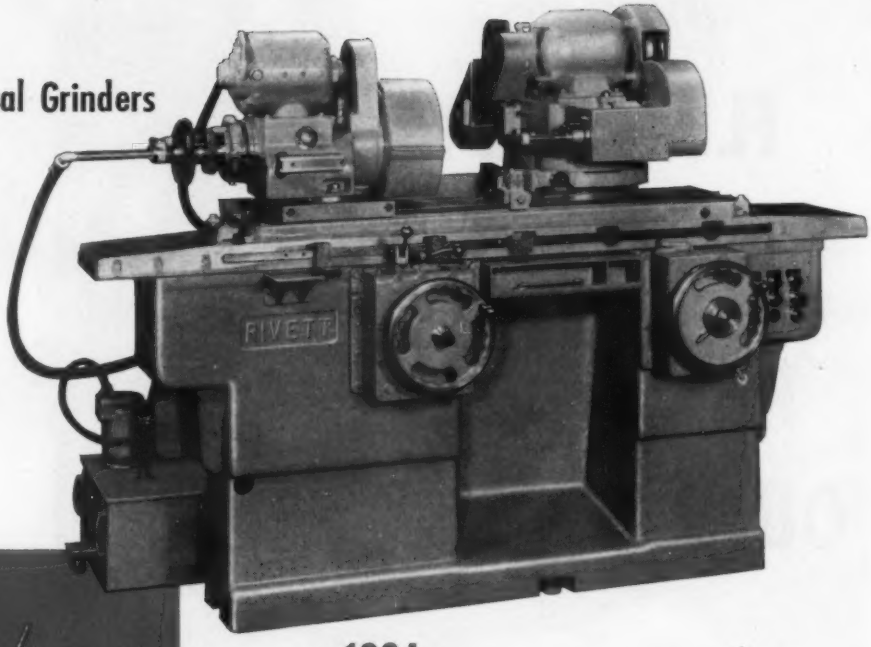
ANN ARBOR, MICHIGAN

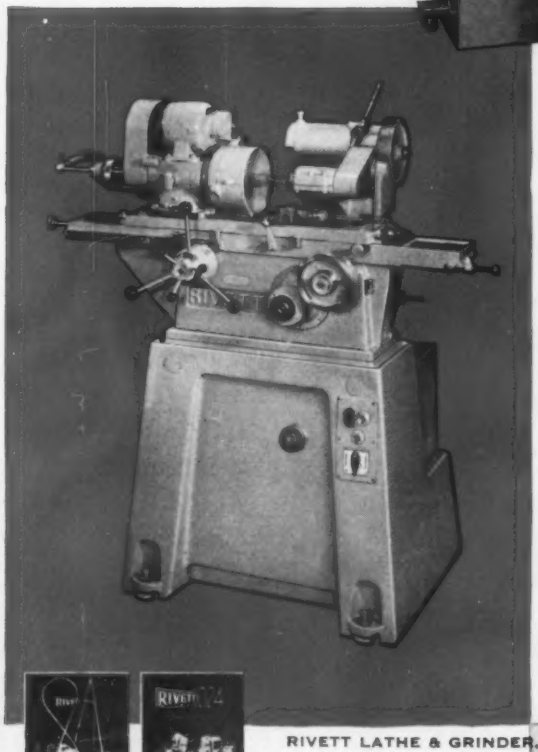
SUNDSTRAND

See American First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

Set-up time reduced!

Rivett Internal and Universal Grinders Lick Largest Cost Item in Toolroom and Small Lot Production!





Rivett 1024 Internal and Universal Grinder

Double-end wheelhead swivels 180°— permits rapid changes to external or internal work. Grinds holes ⅛″ to 9″ dia. and plug gauge to 6″ depth—or to 14″ by retracting wheelhead slide. External grinding to 12″ dia. up to 21″ length. 12″ standard swing over table may be increased to 14″ or 20″ for greater range. Straight, taper, two-angle, face and shoulder surfaces can be ground. Work may be held in collet, step chuck or jaw chuck, on face plate or between centers.

Rivett 84 Internal-External Grinder

A small hole grinder with *flexibility*—mounts interchangeable wheelheads for quick conversion to external grinding. Hole capacity is 3″ dia. with a max. depth of 4″; external to 3″ dia. by 4″ length. Collets and step chucks mount directly in lathe-type spindle, with lever closer for quick operation. Fine hand table traverse with dial stop for shoulder grinding. Mechanical table traverse with infinite adjustment.

Get greater versatility and accuracy! All details are shown in Catalogs 1024B and 84A! Write for copies today!

RIVETT LATHE & GRINDER, INC., BRIGHTON 35, BOSTON, MASS.

Rivett Lathe & Grinder, Inc.
Dept. AMR-3, Brighton 35, Boston, Mass.
Please send: ☐ Catalog 1024B ☐ Catalog 84A.

Name_____

Company_____

City_____ State_____

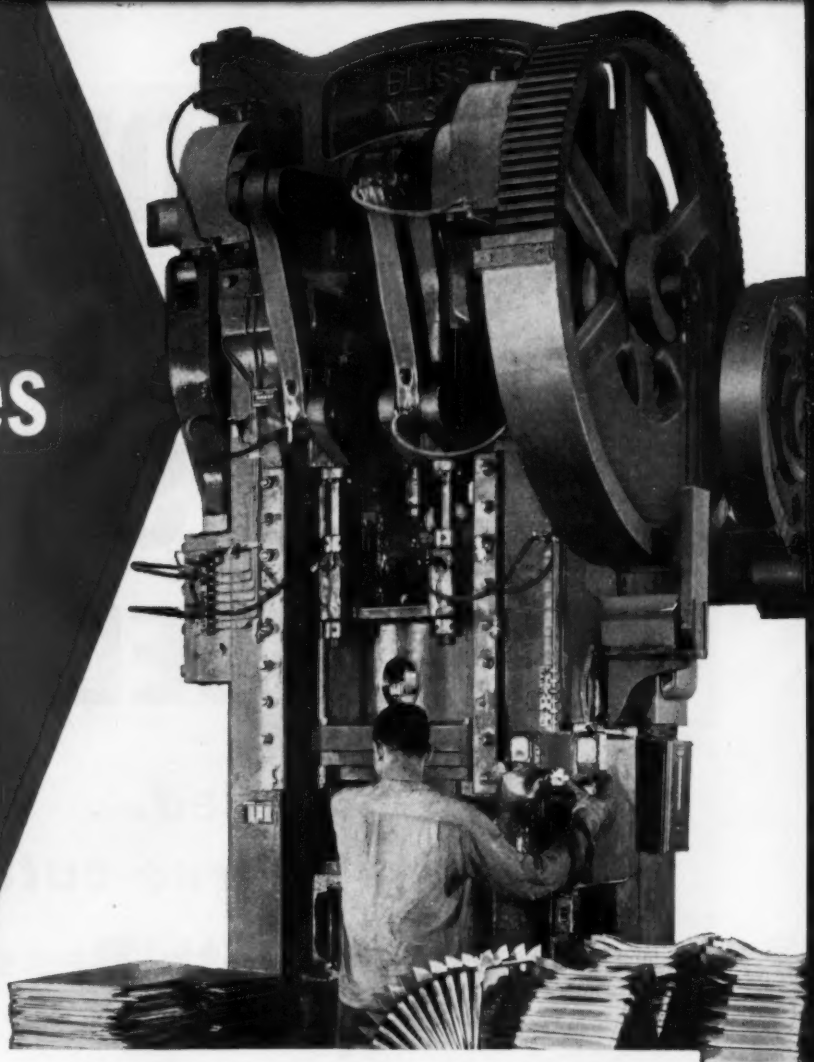
A Symbol of Accuracy in Machine Tools

RIVETT

95% of our presses are BLISS

that's why we're "quick on the draw" at BROIL-QUIK

Broil-Quik's famous Super Chef.



Bliss 3¾ Toggle press cuts and deep draws (to 2 1/16") 1600 Broil-Quik side panels per shift from 0.028" cold rolled steel blanks.

"In our fiercely competitive business, we have to have speed, dependability and little or no downtime," says John Simone, Superintendent. "With Bliss, we get it ... and more to spare. *That's why 95% of our presses are Bliss.*"

After consulting with Bliss engineers, Peerless Electric, Inc., New York, N. Y., makers of Broil-Quik rotisseries, chose the *right* presses for the jobs at hand—

- Bliss 28½ Inclinables—with their adaptability, rugged gap-frame construction and fast, dependable clutch operation—to draw and pinch off steel and aluminum blanks from 0.025" to 0.080" thick.
- And a Bliss 3¾ Toggle Draw press—with powerful blankholding pressure and rugged frame—to deep draw cold rolled steel blanks 0.028" thick.

Like Peerless, thousands of pressrooms are predominantly Bliss. For the fact of the matter is this: there are more Bliss presses in use today than any other make.

Chief among the reasons for this century-old standing is (1) Bliss makes more types and sizes of presses than any other builder; (2) Bliss "grinds no axe" for any one type. As a result you can be sure of impartial counsel from a Bliss engineer—you can count on him to help you pick the *one* right press for the job. Next time, do as thousands do, call Bliss first.

BLISS
SINCE 1857

is more than a name ... it's a guarantee

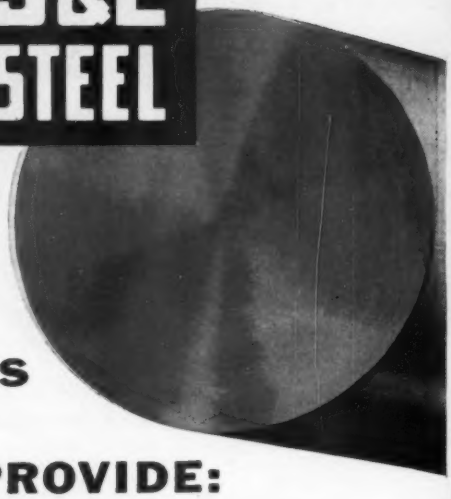
E. W. BLISS COMPANY
CANTON, OHIO
PRESSES, ROLLING MILLS, SPECIAL MACHINERY

Die Supply Division, Cleveland, Ohio
E. W. Bliss (England) Ltd., Derby · E. W. Bliss Company (Paris) France

U.S. Plants in Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; and San Jose, California.

Branch Offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, Los Angeles (Burbank), New Haven, New York, Philadelphia, Rochester, San Jose, Toledo; and Toronto, Canada.

...and NOW COLD DRAWN LEADED STEEL BARS PRODUCED BY J&L STEEL



They're leaded...
they're free-cutting...

available in both Bessemer and Open Hearth grades

J&L LEADED STEEL BARS PROVIDE:

1 ***Faster Machinability...*** because with J&L's Leaded Steels much higher cutting speeds are possible.

2 ***Increased Tool Life...*** because the lead addition in J&L's Leaded Steels lowers the coefficient of friction thereby reducing heat that develops in the cutting edges of tools.

3 ***Improved Surface Finishes...*** because J&L's Leaded Steels machine to fine surface finishes.

4 ***Lower Overall Costs...*** because the free-cutting qualities of J&L's Leaded Steels boost production and, at the same time, reduce part rejections.

CALL J&L TODAY

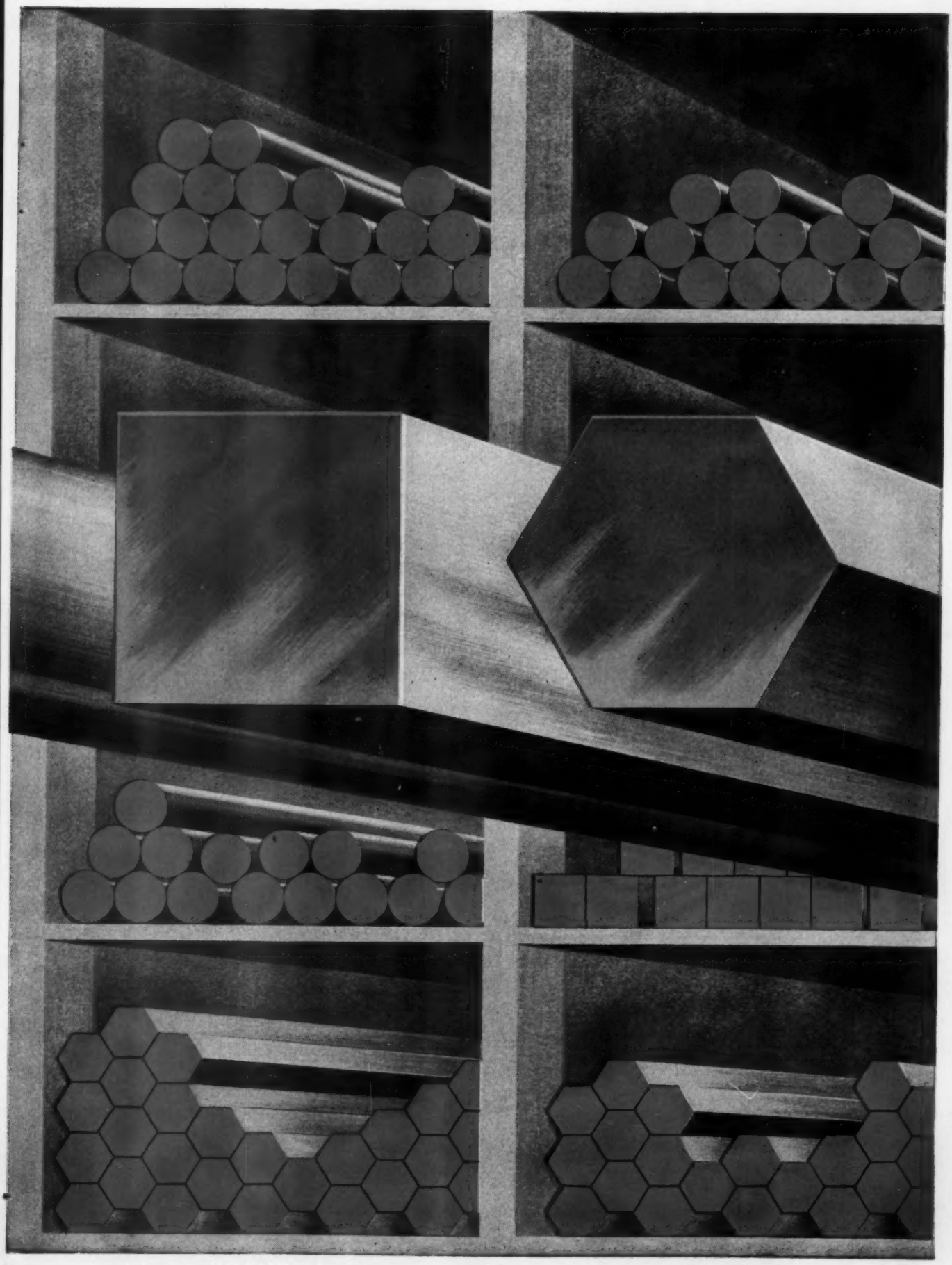
Phone the J&L District office or warehouse nearest you

Jones & Laughlin
STEEL CORPORATION – *Pittsburgh*

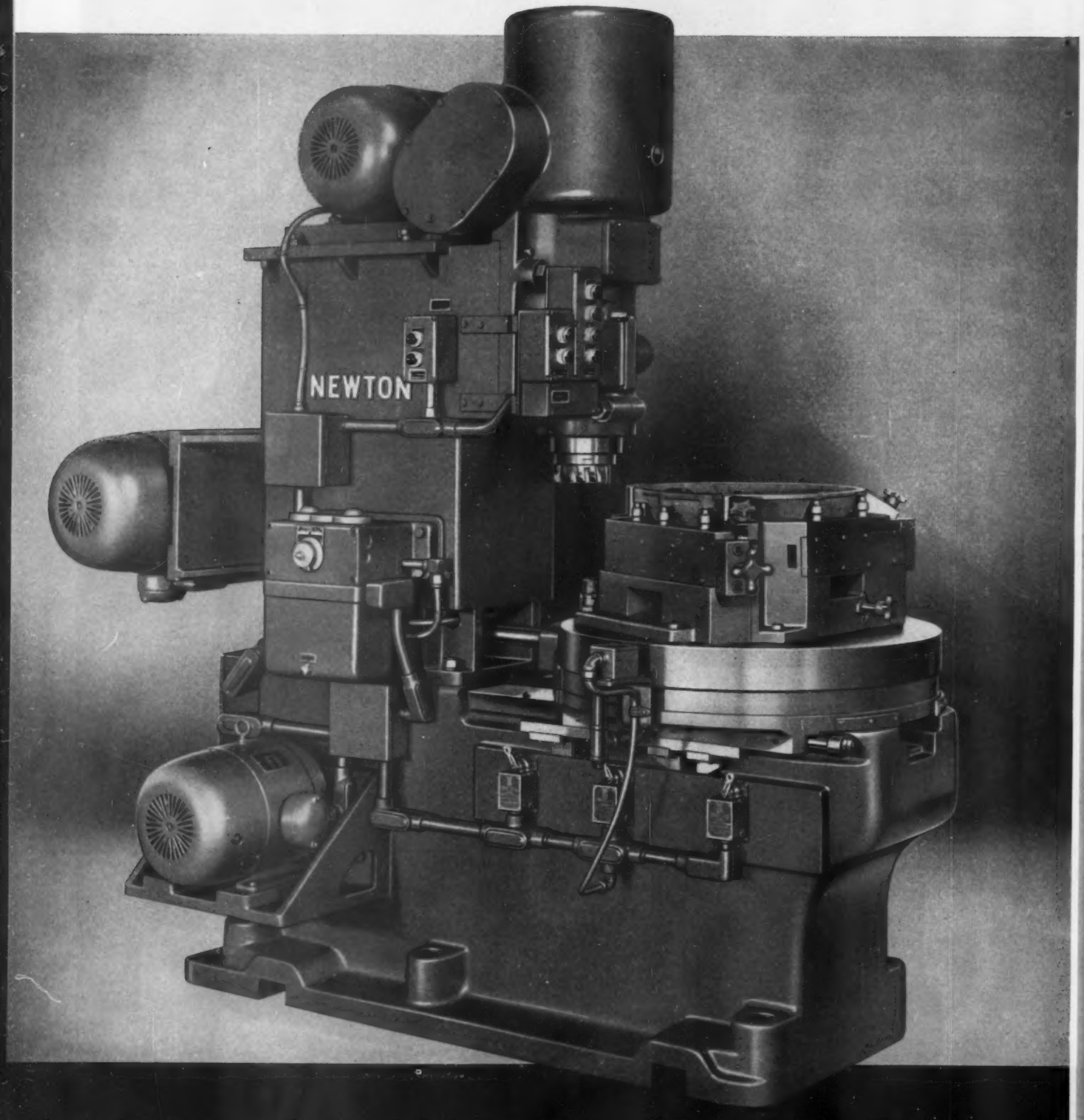
J&L STEEL

SPECIAL MACHINERY

Branch Offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, Los Angeles (Burbank), New Haven, New York, Philadelphia, Rochester, San Jose, Toledo; and Toronto, Canada.



For Milling the flanges

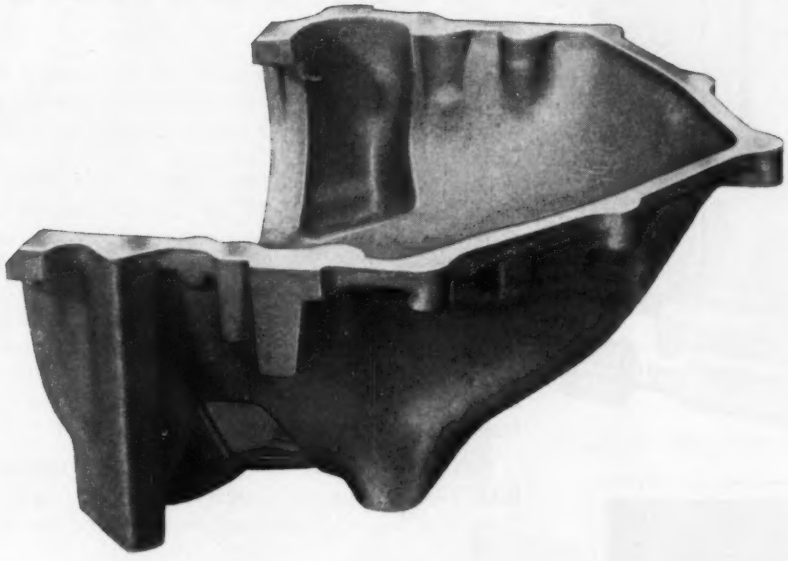


CONSOLIDATED MACHINE TOOL

A Division of Farrel-

of thin Castings...

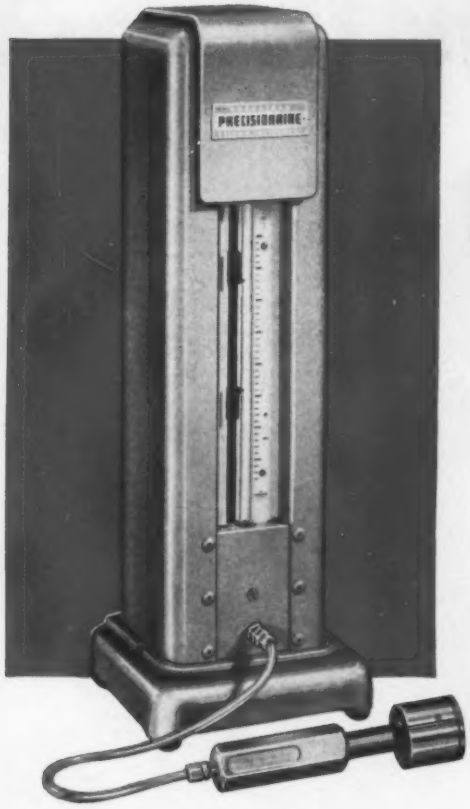
Newton Vertical Rotaries



- You *can't* mill the flange on this flywheel housing like you would a cylinder block. It's too thin for big diameter cutters.
- But you *can* mill it with a small diameter cutter on a Newton Vertical Rotary and *mill it fast!* All the operator does is load, push a button and unload. A 100 per cent automatic feed and traverse cycle does the rest.
- Of course, it is the *circular feeding of the table* that turns the trick and allows you to use small diameter cutters on this kind of work.

COMPANY, ROCHESTER 10, N. Y.

Birmingham Company, Incorporated



A CHANGE IN WORK PART TOLERANCE

Doesn't Obsolete

YOUR PRECISIONAIRE

Immediate conversion to meet an engineering change, a shift from one part to another or a change in tolerance or processing —is an unequalled and exclusive advantage of Precisionaire Column Instruments.

For instance, should the .0005 tolerance of parts being checked with a 10,000 or 5,000 Column Instrument, be changed to .002, *a new instrument is not required.* Merely change over the Precisionaire with a 1,000 or 2,000 Conversion Kit in less than three minutes.

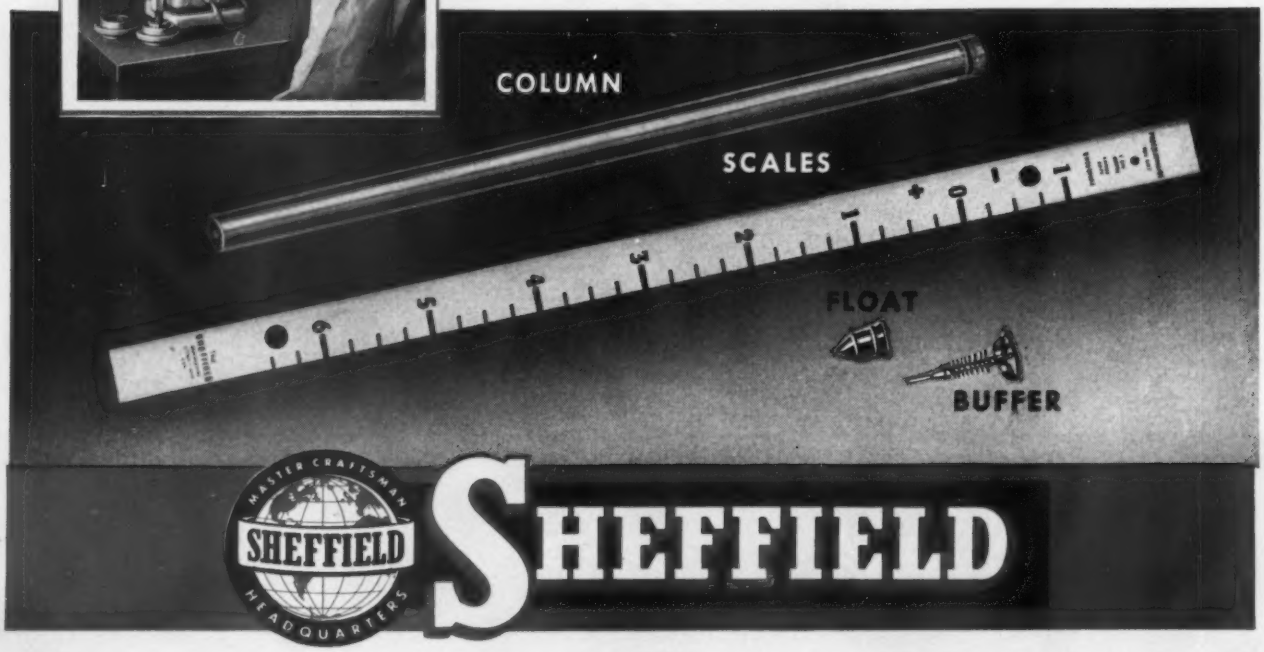
The Precisionaire Column Instrument is always usable this minute, an hour, a week, a month or a year from now, with any appropriate gaging elements, regardless of shifting tolerances, changes in processing and engineering and changeover from one part to another.

NO OTHER AIR GAGE HAS THIS IMMEDIATE FLEXIBILITY—*Precisionaire Column Instruments are always usable.* They are the most universal in use—and the most universally used.

Learn more about the spectacular versatility and economy of Precisionaires—call your Sheffield Representative or phone, wire or write Dayton for a showing of automatic sound slide films on air gaging—they can be shown on your desk.

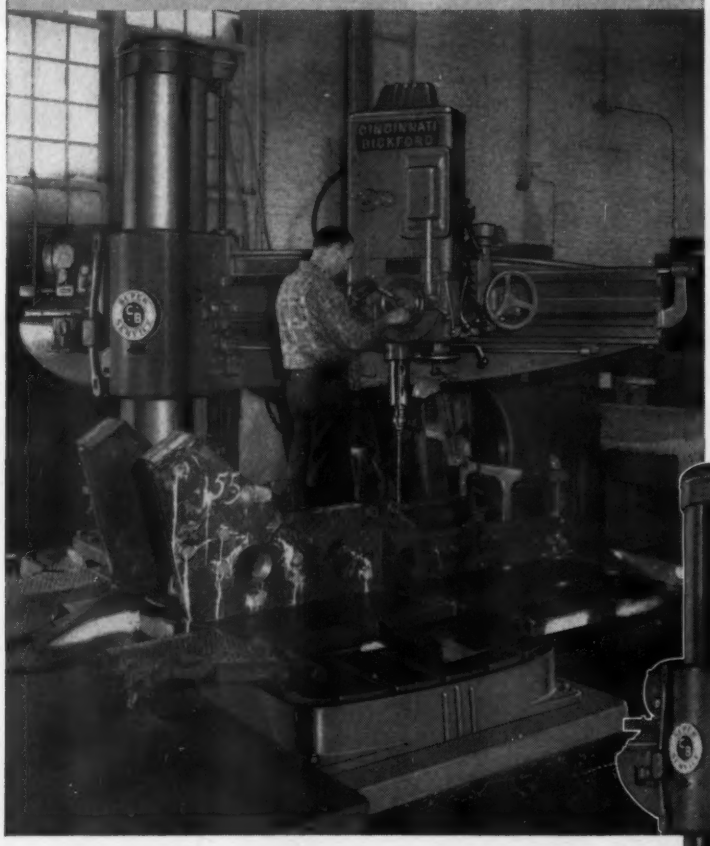
Gage Division, The Sheffield Corporation,
Dayton 1, Ohio, U.S.A.

6767



"top performers"

AETNA-STANDARD ENGINEERING CO.
ELLWOOD CITY, PA.

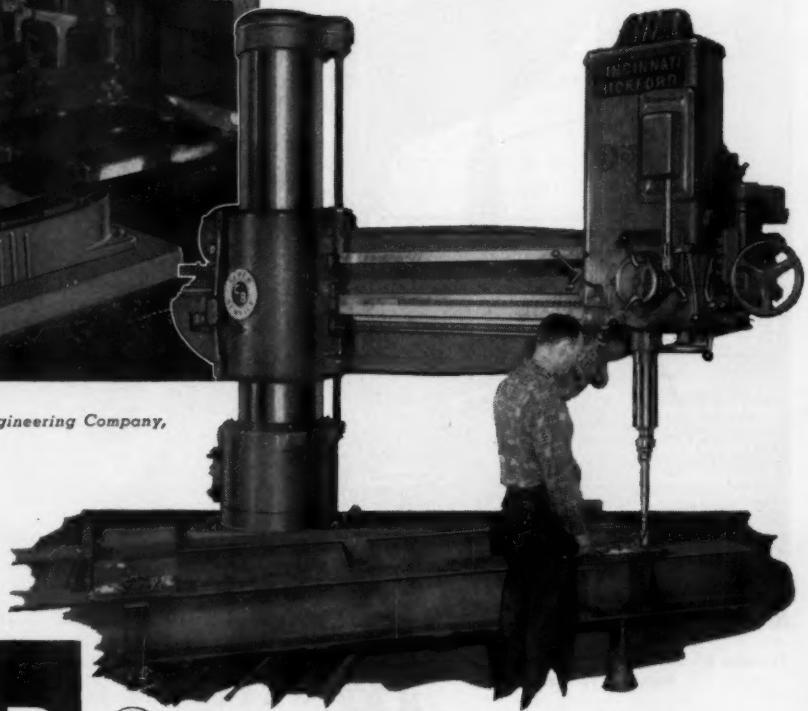


The Aetna - Standard Engineering Company say—"It is our opinion on radial drills that Cincinnati Bickford Super Service Radial Drills are top performers from the standpoint of service and handling ease".

Illustrations show the top carriage of gun carriage being drilled, tapped and reamed complete on this Cincinnati Bickford Super Service Radial—holes from $\frac{1}{4}$" to $1\frac{1}{4}$", limits within .0005".

Write for Booklet R-29.

Photos courtesy of the Aetna-Standard Engineering Company, Ellwood City, Pa.



CINCINNATI
BICKFORD

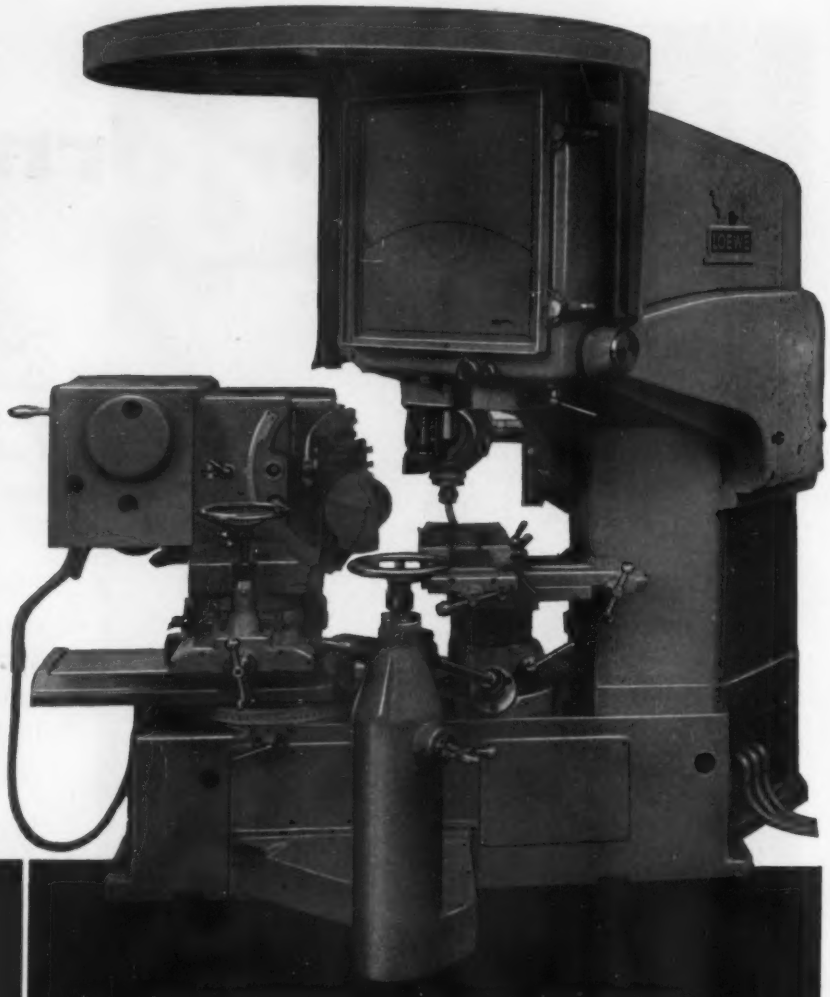
RADIAL AND UPRIGHT DRILLING MACHINES

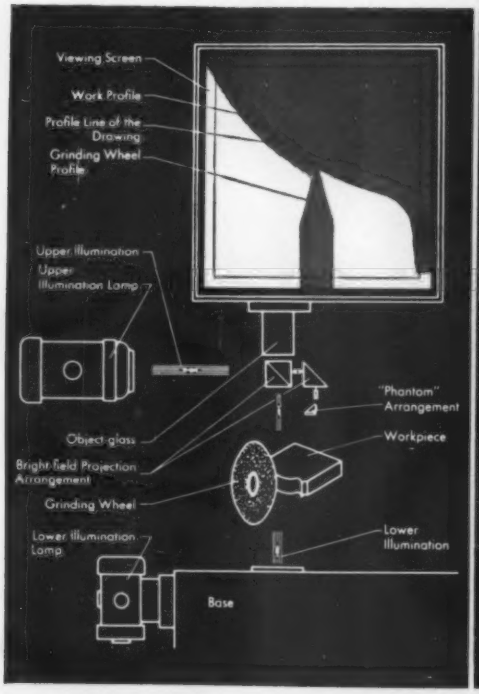
THE CINCINNATI BICKFORD TOOL CO.
Cincinnati 9, Ohio, U.S.A.

OPTICAL PROFILE GRINDER

MODEL "SP" FOR

PUNCHES · SECTIONAL DIES
GAGES · TEMPLATES
FLAT AND CIRCULAR FORM TOOLS





- ★ All forms can be ground with equal ease, speed and precision on this most up-to-date grinder
- ★ Two built-in optical magnifications, 25x and 50x finger-tip controlled
- ★ Dual complete lighting systems for Shadowgraph and refleced Projection
- ★ "Vanishing" shadow of grinding wheel eliminated by steadily projected "Phantom"

Exclusive US. Distributors — Parts and Services

ERIC R. BACHMANN COMPANY, INC.
27-11 41st AVENUE ● LONG ISLAND CITY 1, N.Y. ● PHONE: EXETER 2-1555

ASTE

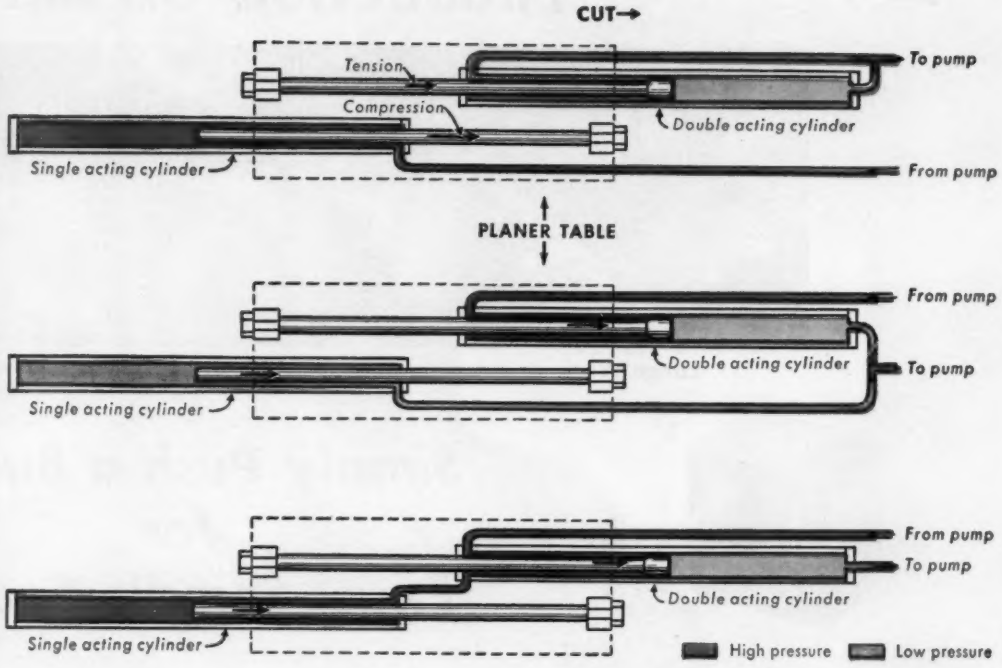
VISIT US AT THE 1955 ASTE WESTERN INDUSTRIAL EXPOSITION AND CONVENTION IN LOS ANGELES · BOOTH NO. 402, EXHIBITION AREA B · MARCH 14 TO 18, 1955 ·

the triple circuit

high speed
LOW CUTTING FORCE

medium speed
MEDIUM CUTTING FORCE

low speed
HEAVY CUTTING FORCE



Infinite Speeds from 10 to 300 fpm. stepped through 3 distinct cutting force ranges.

Pendant control of range and cutting speed selection.

Maximum return speed regardless of cutting speed.

Quick reversals with minimum overtravel.

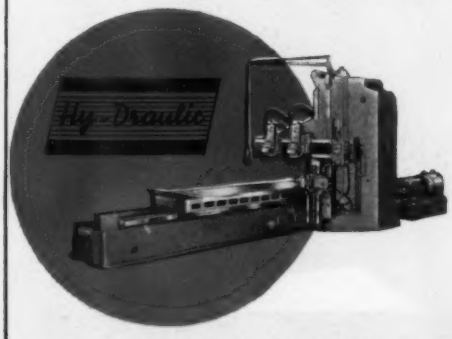
Suitable for prolonged use on short stroke work, as well as long work.

Hydraulic drive and feed has long provided efficiency and ease in the planing and shaping of metal.

Now a singular new dimension has been added to the proven efficiency and economy of Hydraulic planing. The new Triple Circuit provides the correct combination of cutting speed and required force, to most economically machine materials from the free cutting types to the toughest steel.

Many plants, large and small, who are evaluating their present equipment will find the Triple Circuit a significant development in their plans for plant modernization.

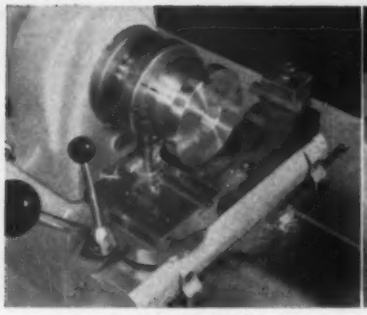
Get full details on this new Hy-Draulic achievement from any Rockfod Machine Tool Co. Representative, or write directly to us.



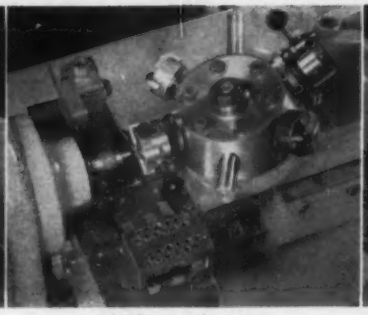
ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

HARDINGE
ELMIRA, N.Y.

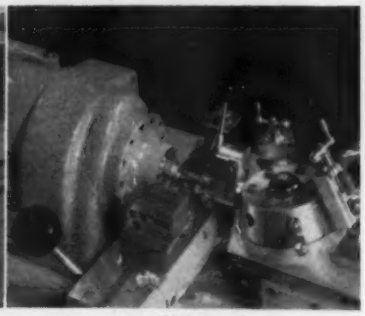
NEW Variable Speed Machine for PRODUCTION DEPARTMENTS



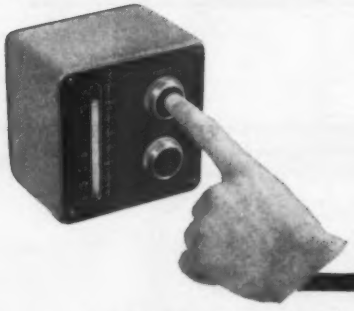
Large Work



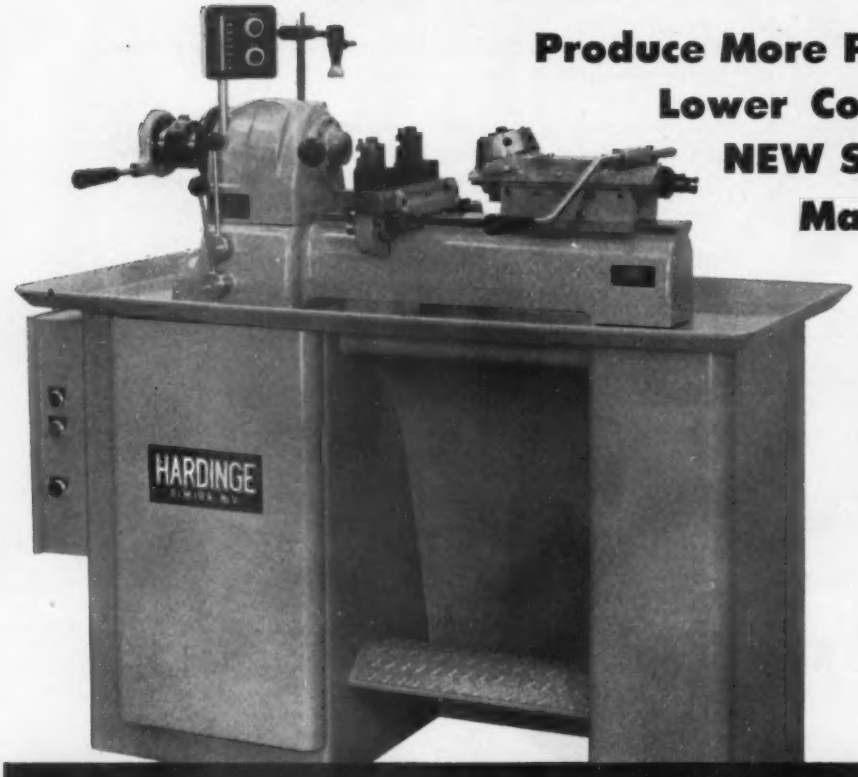
Threading



Small Work



Simply Push a Button for Exact Spindle Speed



Produce More Precision Parts at Lower Cost with this NEW Second Operation Machine

Send for Free illustrated Bulletin DSM59

HARDINGE BROTHERS, INC. ELMIRA, NEW YORK, U.S.A.

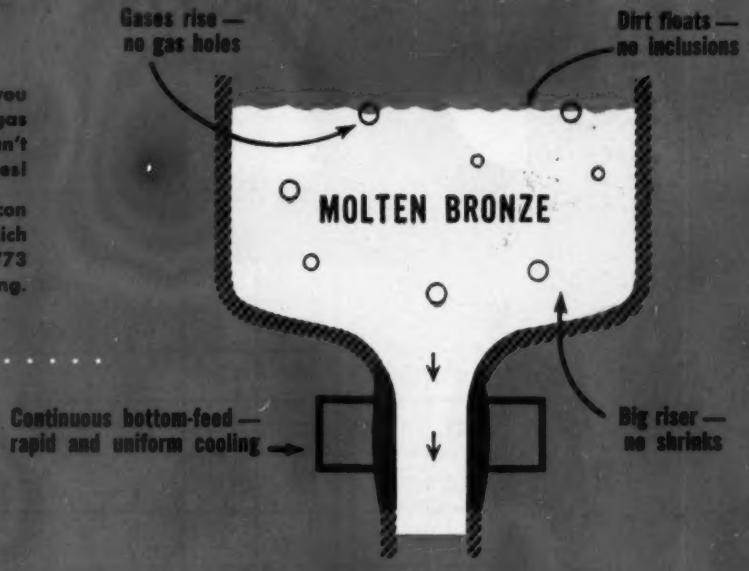
OFFICES IN PRINCIPAL CITIES. Export Office: 269 Lafayette St., New York 12, N. Y.

Save on Bearing Bronzes . . . Asarco's Continuous-Cast Quality and Sizes Conserve Metal and Machine-Shop Time

You lose metal . . . you lose time . . . you ruin tools . . . when machining uncovers gas holes, shrinks, dirt, inferior metal. But it can't happen with Asarcon 773 (SAE 660) bronzes!

The sketch shows how the patented Asarcon process eliminates the metal defects which gnaw at machine-shop profits. Asarcon 773 assures sound castings, profitable machining.

HERE'S WHY . . . . . .


Gases rise — no gas holes
Dirt floats — no inclusions
MOLTEN BRONZE
Continuous bottom-feed — rapid and uniform cooling
Big riser — no shrinks

Save on Lengths: Your distributor gives you exactly the length you want from 0 to 105". You buy less metal. There is no short-end scrap loss.

Save on Diameters: Clean-up allowances on Asarcon bronzes, both inside and out, are only a quarter those of rough-cast bars. You take less out of tools, reduce machining time; and again, buy less metal.

Save on Physical Properties: Quality of metal increases service life of bearings or other parts made of Asarcon 773 . . . cuts downtime.

Buy standard Asarcon 773 bronze (SAE 660) up to 105" long in 216 sizes of round solids and tubes from distributors throughout the country . . . or order special alloys and shapes in any length you want. Mail coupon below for new illustrated bulletin on Asarcon 773.

ASARCO
CONTINUOUS-CAST
RODS · TUBES · SHAPES

AMERICAN SMELTING AND REFINING COMPANY
Perth Amboy Plant, Barber, N. J. • Whiting, Ind.
West Coast Sales Agent
Kingwell Bros. Ltd., 457 Minna St., San Francisco
In Canada
Federated Metals, Canada, Ltd., Toronto and Montreal

AMERICAN SMELTING AND REFINING COMPANY
Perth Amboy Plant, Barber, New Jersey

- ☐ Please send new brochure on Asarcon 773 stock bearing bronze
- ☐ Send literature on other Continuous-Cast Bronzes
- ☐ Send a salesman

Name . . . . . Title . . . . .

Company . . . . .

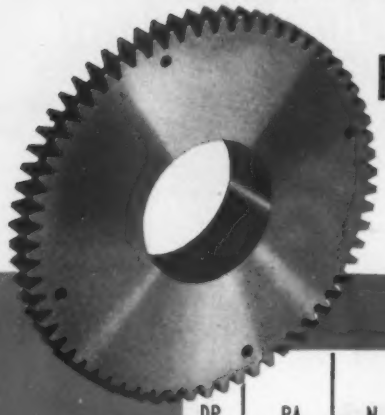
Address . . . . .

City . . . . . Zone . . . . State . . . . .

Barber-Colman

Precision Hobbing Machines

PROVIDE ACCURACY CONTROL



GEAR DATA CHART

GEAR DATA					MACHINE CONDITIONS		INSPECTION RESULTS		COMPARISON TO
DP	PA	N	D	Helix Angle	Hob Speed (RPM)	Feed ("/rev.)	Total Composite Error	Tooth-to-Tooth Composite Error	Agma Accuracy Classification
48	20°	192	4.000	0°	157	.005	.00025	.00005	Class 3 Prec.
48	14½°	128	2.672	3°39'LH	230	.010	.0003	.00015	Class 2 Prec.
64	20°	176	2.750	0°	309	.016	.00035	.0001	Class 1 Prec.
96	20°	64	.667	0°	309	.010	.0002	.0001	Class 2 Prec.
96	20°	16	.167	0°	133	.006	.0003	.0001	Class 2 Prec.
120	20°	21	.175	0°	133	.006	0003	.0001	Class 2 Prec.
32	20°	64	2.000	0°	183	.006	.0010	.0004	Class 1 Prec.

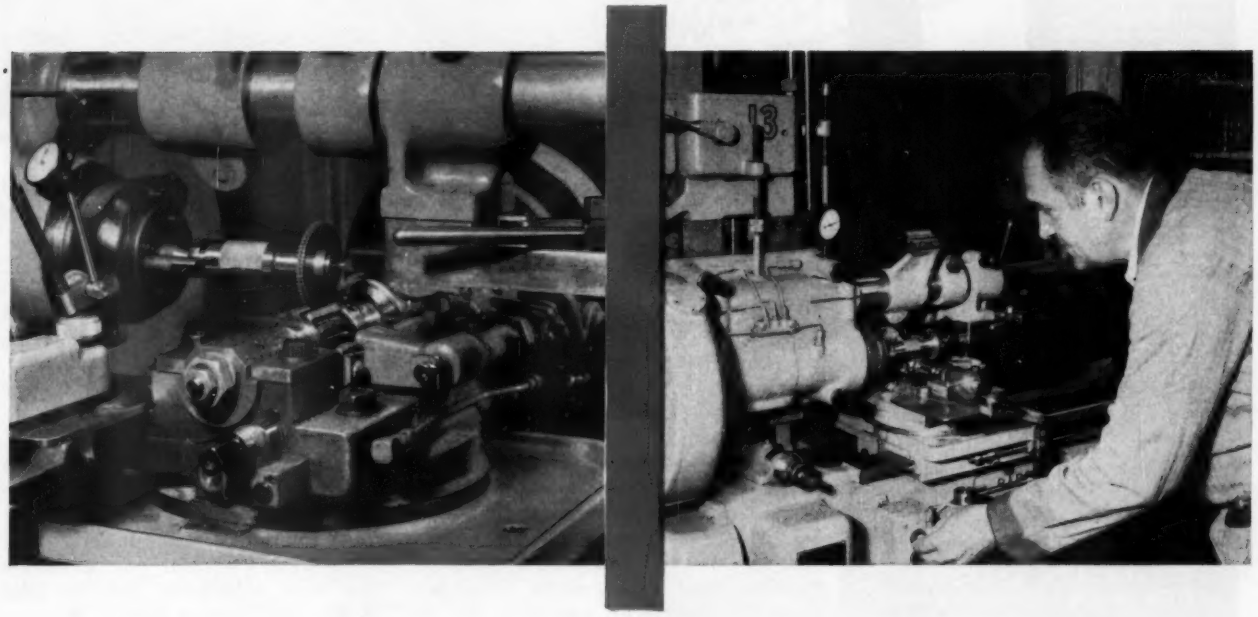
This precision gear manufacturer hobs gears in all of the precision classes shown in ASA B6.11-51, "Inspection of Fine-Pitch Gears". While the quantity of gears cut per production order is usually quite small, the methods used indicate the important elements which must be controlled in any precision gear cutting operation.

To obtain the finest accuracy, this plant uses Barber-Colman Precision No. 6-10 Hobbing Machines, in combination with Class AA ultra precision hobs. Precision Class 2 tolerances are held, and these results on fine pitches are generally considered the best obtainable. Only Class AA hobs are used for gears of this accuracy because any inaccuracies occurring in the hob will produce gear tooth profile errors which in turn contribute to tooth-to-tooth and total composite errors. These ultra precision hobs are maintained at peak accuracy by periodic precision sharpening on Barber-Colman sharpening machines, removing .005" stock or less, depending on pitch. Hobs are inspected after each sharpening to standard tolerances for Class AA hobs.

Prior to hobbing, all blanks are machined to precision tolerances. For all precision gears, squareness of the face with the bore, accuracy of the bore, and lateral runout

B U I L D E R S O F P R E C I S I O N G E A R

Precision Class AA Hobs
NEEDED FOR PRECISION FINE PITCH GEARS



should be held to the standard tolerances for that particular class of gear. The blank must run true within these tolerances when it is mounted on the hobbing machine. For the utmost accuracy, gears are hobbed between centers. Prior to mounting the work, the line-up of the centers is checked with a test bar. Finished gears are rolled with a master gear or rack.

Using this general procedure for each precision gear, this plant produces gears of finest accuracy, as indicated in the table.

Although the degree of accuracy may vary in some applications, these methods and controls indicate some of the important elements which must be controlled.

If you require precision gears of the finest accuracy, you can meet the rigid specs with Barber-Colman hobs and equipment. For specific hob applications, write our engineers or call your Barber-Colman representative for full details.

HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

BARBER COLMAN

Barber-Colman Company

GENERAL OFFICES AND PLANT, 613 ROCK STREET, ROCKFORD, ILL.

HOBS AND MACHINES SINCE 1911

Keep Your on the OLIVER Line
— Cost Cutting Production Boosting MACHINE TOOLS

OLIVER DRILL POINTERS

Properly machine ground drills give better performance. OLIVER Drill Pointers, with each lip doing equal work, give balanced cuts—more accuracy—more perfect holes—more efficiency—longer drill life.

As Illustrated:

No. 21 Oliver Bench Drill Grinder. Hand operated for Drills No. 57 to ½".

No. 510. For Drills ¼" to 3"—2-3-4 flute.

OLIVER DIE MAKING MACHINES

Efficient, speedy and accurate — effecting great savings in time and costs. Skilled labor is not required for sawing, filing and lapping operations.

Available in 5 Models.

Bench Model S-1 (Illustrated) — Single Speed Die Maker for use on Tool Steel up to 1" Thick.

Heavy Duty Model (Illustrated) — 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

OLIVER ACE UNIVERSAL TOOL & CUTTER GRINDERS

Keep your most difficult cutters sharp with Oliver ACES. They excel on high speed and Tungsten-Carbide work. Direct reading for clearances reduces fatigue — eases operators' jobs.

The ACE excels for grinding face mills up to 15" —also, slab mills • slitting saws • all types cutters and reamers.

2 Models: Heavy Duty (Illustrated) and Standard.

OLIVER 20" TEMPLATE TOOL BIT GRINDER

Efficiently powered by a 3 h.p. motor, this OLIVER Machine grinds on the periphery of a 20" wheel. Capacity: tools up to 1½" wide x 1¾" high from 0 to 20° clearance. The OLIVER is developed for production sharpening of single point Tungsten-Carbide and high speed tools—offers increased production, lower tool costs and savings in man-hours. Extremely fine finish assured.

Write Today For Complete Information

OLIVER INSTRUMENT CO.

1414 E. MAUMEE • ADRIAN, MICHIGAN

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

"How To Work Steel"—Addendum

In the section on stainless steel in the report, "How to Work Steel," in the 1955 Production Planbook Issue of American Machinist, *we stated that hydraulic holddowns were desirable for shearing polished stainless* (AM—Mid-Nov '54, p123). *Our attention has been called to the existence of a mechanical holddown designed to contact the work with individual feet with low impact. This design would seem to also provide a satisfactory method for shearing polished stainless, and we regret that it was overlooked in the original report.*—Ed.

Pre-Stress

Based on thirty years of tests and shop experience, I believe that machine tools could be built somewhat better than at present by incorporating built-in counterstresses. In other words, the machine should have built-in stresses greater than can ever be exerted by the cut.

The matter should be studied by a number of progressive designers, as it is too big for one man. For example, I believe the bed of a lathe could be counterstressed by truss rods installed in cored holes, placed under tension and keyed up before the bed is machined and finished.

Great thought should be given to the carriage, feed mechanism, and tool holder. The tool should be supported as near the cutting edge as possible by a cam-operated jack exerting greater stress than the cut could overcome. The main thought would always be to prevent chatter when the tool enters the cut. If the lathe can be thus improved, other machines may also come into the picture for study.

Oscar Craft
Brazil, Ind

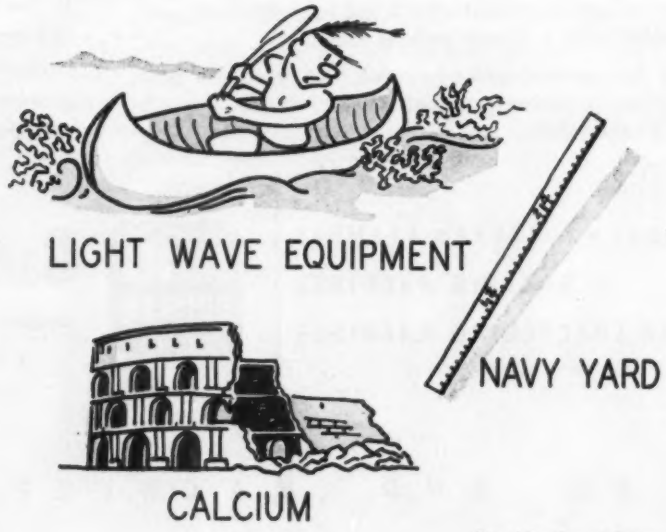
Old Masters

I read with considerable interest your article, "On-the-job shortcuts in die making" (*AM*—Jan 3 '55, p97). Like most of your articles it was most interesting and informative.

I would, however, like to take exception to one of the captions (p101) which read, "Lettering was hand engraved for better quality and because the height of the lettering was 0.005 in. ± 0.0002 in." I cannot see how these tolerances could be held by any other means than by machine engraving, using a pantograph. Ma-

GRINETICS

By D G SMITH



Republication rights reserved.

LEWIS-SHEPARD *favors Faster Work Handling and gets it....*

with

LELAND-GIFFORD DRILLING MACHINES

As manufacturers of materials handling trucks, Lewis-Shepard appreciates the value of efficient work handling in their own production. They use Leland-Gifford Multiple Spindle Drilling Machines to speed drilling, reaming, facing, deep hole drilling and tapping operations . . . to step up both the quantity and quality of work produced — to save the time and energy lost in working with less versatile machines.

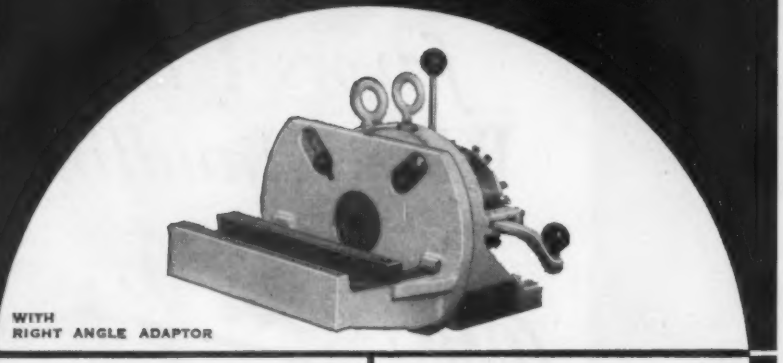
With Leland-Gifford Multiple Spindle Drilling Machines the right tools for the job are always ready to use, in the combination and sequence called for, with the right speed accurately set and checked by convenient hand wheel and the Leland-Gifford *Indicating Shift.*

The complete line of Leland-Gifford Drilling Machines offers you a wide choice of machine sizes, number of spindles, swings and types of feed. If precision drilling is part of your business, you should have complete information. Write for it today.

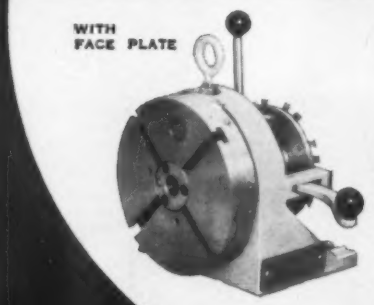
LELAND-GIFFORD
Drilling Machines
WORCESTER 1, MASSACHUSETTS, U.S.A.

- **CHICAGO 45**
  2515 West Peterson Ave.
- **DETROIT**
  10429 West McNichols Rd.
- **CLEVELAND 21**
  P. O. Box 217
- **NEW YORK OFFICE**
  75 South Orange Ave.
  South Orange, N. J.
- **LOS ANGELES OFFICE**
  2620 Leonis Blvd., Vernon 58, Cal.
- **INDIANAPOLIS 6**
  P. O. Box 1051
- **ROCHESTER 18**
  P. O. Box 67, Roselawn Station

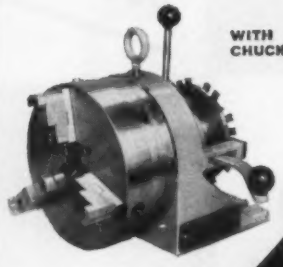
"...one of the most useful pieces of equipment in metal working plants throughout the country."



WITH RIGHT ANGLE ADAPTOR



WITH FACE PLATE



WITH CHUCK

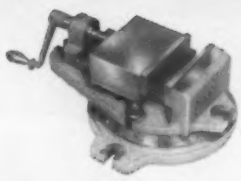
3-WAY

INDEXING TRUNNION

Gives new, *simple* mounting of work or jig plus rapid, controlled rotation to correct angular positions. Used on radial drills, boring mills, planers, milling machines, and sensitive drills.

This is a basic, versatile production unit which speeds up multiple same-piece operations on either long or short runs.

Request Bulletin J7 for complete details.



STURDY, ACCURATE machine vises, made with more than the usual care. Available with or without calibrated swivel base.

UNIQUE, SIMPLE work holder for indexing and positive clamping of difficult parts in milling or pantograph operations.

J&B

EST. 1870

JOHNSON & BASSETT, INC.

PRODUCTION TOOL DIVISION

WORCESTER, MASSACHUSETTS

chine engraving is not a new process, but it has attained major importance in the last 15 years because of its ability to maintain repetitive accuracy on precsion marking dies. Any marking die that must do another operation, such as forming or coining, must be so produced. Some of the finest pantographs are manufactured by the George Gorton Machine Co, Racine, Wis. These are more than capable of producing the work illustrated, within the limits required.

W A Freeman, factory mgr,
Barnard Stamp & Stencil Ltd
Hamilton, Ont, Canada

Four old-timers in the employ of Sossner are past masters at hand engraving in a vertical milling machine; they were doing this kind of work before pantographs came into prominence. Because of their long-time experience, they can hand engrave a die twice as fast by this method as by a pantograph. However, their special talents are used only when a die demands close tolerances and high quality. Otherwise, the die is set up in a pantograph.—Ed.

Erratum

In a recent issue (AM—Feb 14 '55, p147) *we incorrectly stated that the operation show in the lower right-hand illustration was seam welding. It is actually seam rolling—a Ryan-developed technique for eliminating manual grinding of excess weld metal.*—Ed.

Then and Now

The question of machine-tool prices has been the subject of much argument ever since I started to work in a machine shop, over 70 years ago. Comparing prices between then and now is as futile as likening the $500 Model T to to the 1955 models. For, among other things, we must remember that a good machinist now gets as much per hour as we used to get for a 10-hr day.

Doubtless there are many jobs for which the low-cost, comparatively plain machine tool will meet every requirement. But where low-cost quantity production is concerned, modern shop equipment, although much more costly than in the past, is far from being overpriced.

I recall hearing the manager of a large automobile plant, where parts were made in large quantities for those days, complain at the price of a special machine for camshafts. It was quite a small machine, but it had cost $2000, and the manager was comparing it with what $2000 would buy in an automobile at the time.

It happened that, only the day before, I had been in the plant that made these machines, and I had been told how much had been spent on development, how few had been sold, and how limited the market was. I relayed this to the fault-finding manager and told him that the makers were probably going broke, building a machine which he himself admitted would pay for itself in a year.

Some of us remember when some automobile makers, feeling that machine-tool prices were too high, subsidized small shops to build machine tools for them. They soon found that, while they might save a few dollars on some machines, the regular builders had brought out new models that made their "home-made" equipment obsolete. Henry Ford is reported to have said at one time that machine tools should be built in mass production, like his Model T. But there is not sufficient demand for even the most efficient machine tool to be made in quantities that compare with automobiles.

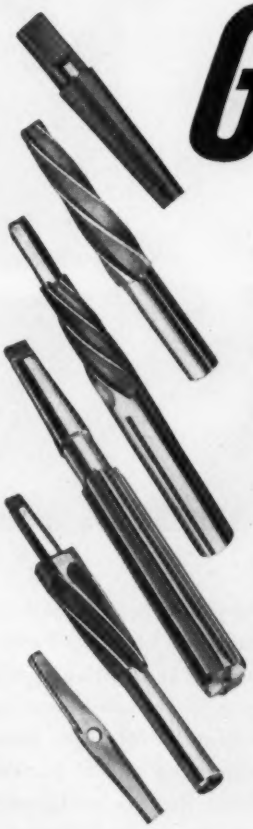
It is not uncommon to have users buy machine tools on the basis that they will pay for themselves in from one to two years, so they can be scrapped when the work for which they were designed is discontinued. In some cases, such machines have paid for themselves in six months. The builder must make his profit on limited sales; the user profits as long as he can keep the machine in operation, or until it becomes obsolete because the builder has designed and built a more efficient one.

I know of one case where a dozen rather expensive machines were never installed in the shop which ordered and paid for them. The reason was that, while they were being built, another and better machine had come onto the market and it was cheaper to scrap the machines ordered and buy later and better ones.

Fred H Colvin
Point Pleasant, NJ

FOR SPECIAL REAMERS . . . REMEMBER

GORHAM



They may not *look* alike, but all of the special tools on this page share a common function . . . *because every one is a reamer!* Each was engineered and manufactured by Gorham Tool Company to provide a practical solution to a specific production machining problem for one of our customers.

Actually, these reamers represent just a few of the many special-purpose cutting tools produced by Gorham. Others include milling cutters and end mills, inserted blade cutters, flat and circular form tools, profile cutters, and carbide tipped tools of every description. Gorham "specials" are turning problems into profits in thousands of plants every day . . . and the one we engineer for you will solve *your* next production machining problem, too! Take advantage of our experience.

Your nearby Gorham Field Engineer is a qualified cutting tool expert in both practical design and actual application, and his assistance is yours without obligation. Just write for his name, or send details of your problem direct to us. We'll have him get in touch with you promptly.

Gorham TOOL COMPANY

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

14408 WOODROW WILSON • DETROIT 3, MICHIGAN

WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne, Calif.

STANDARD

STANDARD OIL COMPANY
(Indiana)

Tool Room Superintendent Max Chase (left) and Production Engineer Peter Van Dyke (right) with Standard lubrication specialist R. T. Cleland inspect frame of extruded aluminum. Bob Cleland, a graduate of Michigan State with a B.S. in Mechanical Engineering and of Standard's Sales Engineering School, has the background to provide customers with competent technical service on their lubrication problems. This training and experience, customers have found, pay off *for them.*

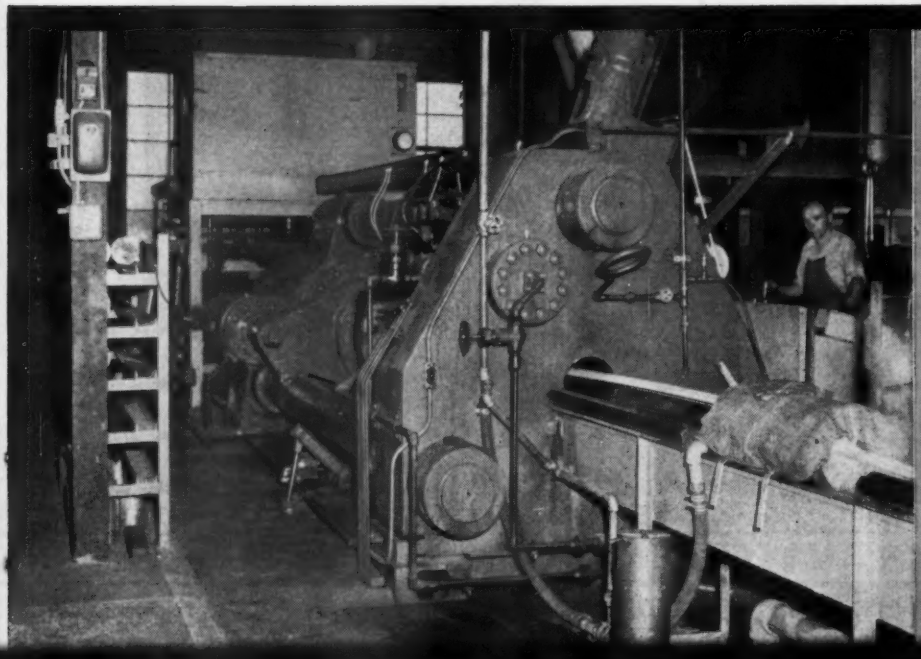
STANOIL *Industrial Oil does heavy chores for Light Metals Corporation*

Three years ago Light Metals Corporation, Grand Rapids, put their 1,250 ton Hydropress into operation. The initial fill for the hydraulic system was STANOIL Industrial Oil. The press has operated continuously since its start up. There is no evidence of deposits or varnish anywhere in the hydraulic system. Light Metals Corporation looks forward to many more years of such trouble-free operation.

Why was STANOIL ordered by Light Metals for their Hydropress? The answer is found in the service STANOIL has given in other equipment. Back in 1948 when a Watson-Stillman extrusion press went into operation for Light Metals, STANOIL was chosen as the hydraulic oil. As with the Hydropress, STANOIL has a perfect performance record. The Watson-Stillman press has operated seven years without a shutdown because of hydraulic fluid failure.

This kind of service from a hydraulic oil means Light Metals Corporation can turn out extruded aluminum shapes for the aircraft, automotive and major appliance industries with high performance and low maintenance factors that mean bigger profits. Reason enough for relying on STANOIL.

STANOIL Industrial Oil can perform for you just as it is doing for Light Metals Corporation. In the Midwest a lubrication specialist from your nearby Standard Oil office will explain how. Call him. Or contact, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.



Light Metals Corporation uses this 1,250 ton Hydropress for extrusion of aluminum shapes for aircraft, automotive and major appliance industries. Press operates at 2,840 psi in the hydraulic system. Hydraulic medium is STANOIL.

EASIER OPERATION
FASTER PRODUCTION

..are under your thumb!

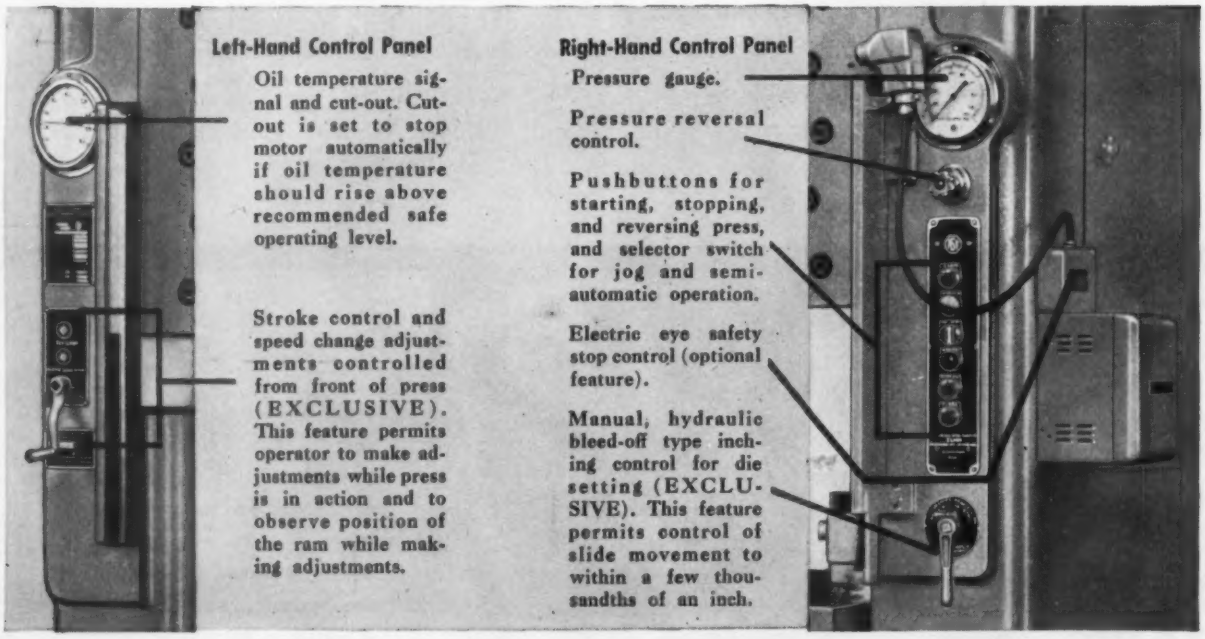
with the sensitive, floor-level *Control System* on ELMES Presses

ELMES 450-TON
SINGLE-ACTION DRAWING
AND FORMING PRESS

Elmes simplified controls—all at floor level—have made hydraulic press operation fast, accurate, instantly responsive. Operators of Elmes® Presses have *confidence* in the precise, unfailing control at their command.

Illustrated and described below is the Elmes control system for single-action presses. (Note especially those features which are *exclusively* Elmes.) These same controls, plus additional control features, are provided on Elmes double-action presses.

Elmes engineers have the long and specialized experience that is all-essential for helping you solve your metal-pressing problems to the *best* advantage. And they're ready to do so at all times. For recommendations and cost estimates, see your Elmes Distributor, or write to us direct.



Left-Hand Control Panel

Oil temperature signal and cut-out. Cut-out is set to stop motor automatically if oil temperature should rise above recommended safe operating level.

Stroke control and speed change adjustments controlled from front of press (EXCLUSIVE). This feature permits operator to make adjustments while press is in action and to observe position of the ram while making adjustments.

Right-Hand Control Panel

Pressure gauge.

Pressure reversal control.

Pushbuttons for starting, stopping, and reversing press, and selector switch for jog and semi-automatic operation.

Electric eye safety stop control (optional feature).

Manual, hydraulic bleed-off type inching control for die setting (EXCLUSIVE). This feature permits control of slide movement to within a few thousandths of an inch.

ELMES

AMERICAN STEEL FOUNDRIES • ELMES ENGINEERING DIVISION
1161 Tennessee Avenue...Cincinnati 29, Ohio

HYDRAULIC PRESSES & EQUIPMENT

METAL-WORKING PRESSES • PLASTICS MOLDING PRESSES • PUMPS • ACCUMULATORS

XLO

Spot News of Metalworking . . .

Automatic assembly of electronic units . . .

Autofab is General Mills Inc's name for its fully automatic machine that will assemble as many multiple-part electronic units in a minute as an average worker can in a day with conventional methods. (See p176).

Now it's shell cores for castings . . .

Shalco Engineering Co has just completed a shell core blower for delivery to a Canadian firm. Core box halves are mounted between electric heating plates and mixture of sand and phenolic resin is blown in. Result: a hollow core that permits casting of internal surfaces to close tolerances.

Self-resetting lathes and "feed forward" . . .

First machine tools other than grinders to be announced as employing the feedback principle are self-resetting lathes (see p117). Also in service, but not yet announced, is a Borematic at Buick that does the same thing. Engineers now are talking of "feed forward" as the next principle to be applied — the gage on one machine transmitting dimensions to the machine ahead so infeed point may be adjusted for the checked piece when it arrives. All this to slash "air-cutting" feed time and minimize variation from springback.

Ford expansion bears out GM optimism . . .

Ford Motor Co, just getting its second Cleveland engine plant into operation, is already said to be making plans to double its size. Add to that Ford's announcement that will build a 600,000-sq-ft parts plant near Sandusky (replacing Detroit's Mound Road plant) and it looks like Ford agrees with GM's Harlow Curtice that total car and truck production has a potential of 8.3-million units a year if "we continue to enjoy labor peace."

Japanese arms for Japan . . .

Japan's arms and aircraft industries are pushing plans to make jet planes, howitzers, tanks, recoilless guns and underwater weapons under authorization of a U S Defense Board order to modernize Japanese defense forces.

U S guided missiles for Britain?

Great Britain is negotiating with the U S Defense Dept to buy guided missiles from this country. First purchase would be the surface-to-surface "Corporal," produced jointly for the Army by Firestone and Gilfillan Bros.

British boring mill shipments to Russia rouse U S ire . . .

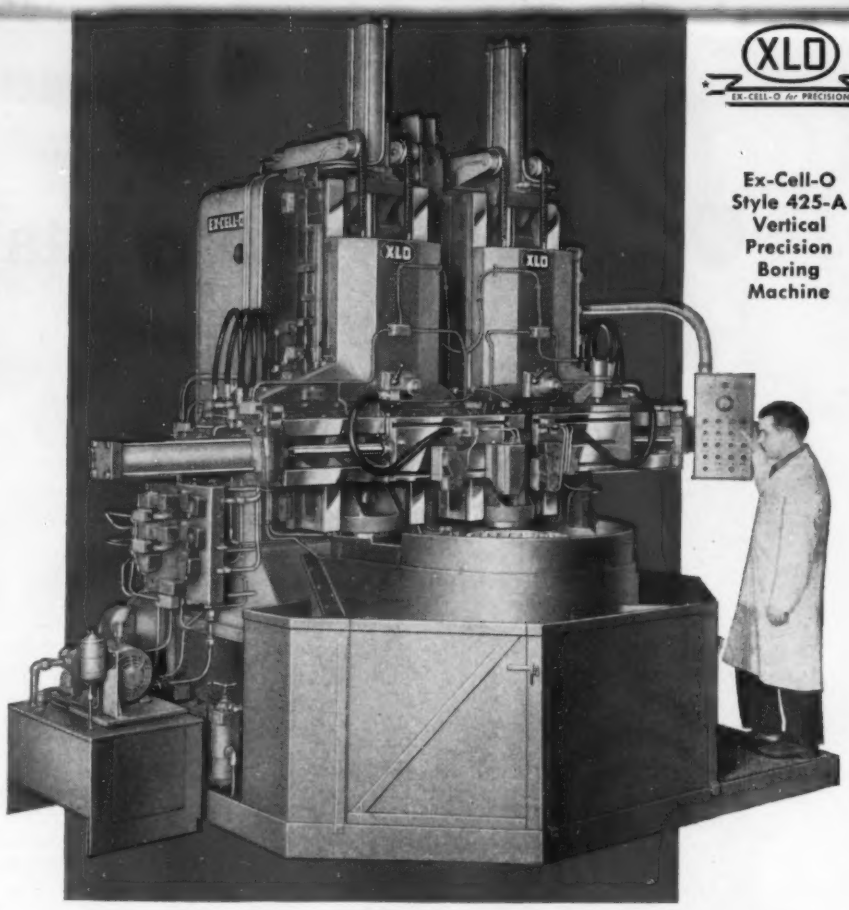
British government has okayed shipment of 26 huge, British-built horizontal boring mills to Russia. U S Dept of Commerce has protested vigorously on grounds that machines of this type and size are strategic, and will certainly be used to produce military goods. (See p107).

Boeing has been awarded a $460 million contract for jet tankers . . .

Air Force's jet tanker competition has wound up with Boeing getting the $460 million contract — the second for that firm. The Air Force plans to order $700-million worth over "an extended period."

Versatile, Automatic

BORING, TURNING, FACING OF LARGE PARTS - WITH THIS



Ex-Cell-O Style 425-A Vertical Precision Boring Machine

EX-CELL-O VERTICAL PRECISION BORING MACHINE

Developed by Ex-Cell-O, this standard Style 425-A Vertical Precision Boring Machine is massive and versatile. It has a heavy-duty, high-speed work spindle and rigid tool slides for close-tolerance work with a fine surface finish. It's designed for accurate production work on large parts.

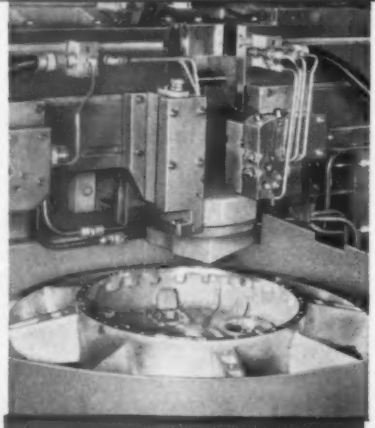
The heavy cast base supports a column on which two vertical slides are mounted, each carrying a cross slide. Slides are operated by large hydraulic cylinders and move on hardened and ground steel ways. Vertical slides are fully counterweighted. All these features mean smoother operation.

The large work spindle supports a 36-inch diameter table having T-slots for mounting fixtures. The table is driven through a precision worm at variable speeds up to 500 rpm.

The machining cycle is completely automatic, including movements of vertical and cross slides, changes in work speeds, flow of coolant, and lubrication.

For more information and complete specifications on this 425-A machine call in your Ex-Cell-O representative or contact Ex-Cell-O in Detroit today.

12 Features OF EX-CELL-O'S 425-A MACHINE:



Close-up view of a Style 425-A equipped for operations on a jet compressor frame. Tools in the left slide face 2 surfaces, turn one diameter and chamfer one edge. The right-hand slide carries tools for feed-facing, precision boring and chamfering.

55-B

- Massive, Rigid Construction
- Easy Loading and Unloading
- Variable Speeds to 500 RPM
- Counterweighted Slides
- Large Hydraulic Cylinders
- Hardened and Ground Ways
- Flexible Automatic Cycles
- Automatic Speed Changes
- Automatic Coolant Control
- Automatic Lubrication
- Conforms to J.I.C. Standards
- Skilled Operator Unnecessary

EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

Washington . . .

Renegotiation up in the air . . .

There's new talk of extending the Renegotiation Law. It expired two months ago. The White House seems to be standing aloof on the issue, is letting Congress carry the ball.

Two bills have been introduced to extend the act—by Rep. Carrigg (R, Pa) and Sen Dworshak (R, Idaho). Chances of passage are 50-50. It's a good political issue, and the Formosa situation has added some fuel to the fire.

Air Force Secretary Talbott is reportedly backing the law's extension. The other services are uncommitted so far. Meanwhile, you can look for increased use of price redetermination clauses in military contracts in the absence of renegotiation.

Aircraft makers and shipbuilders now fall under the Vinson-Trammel Act of 1934, in place of the Renegotiation Law. The old law sets profit limits on individual contracts, 12% on aircraft, 10% on vessels. The Renegotiation Law is more flexible, allows contractors to balance losses on one contract with profits on another.

Draft deferments revised . . .

Washington has slashed the list of critical occupations and essential industries that serve as basis for draft deferments. But the cut may be only academic. Draft calls are also being reduced. Calls will probably be down to only 8000 monthly until at least July (down from a peak of 80,000 during Korea). Of interest to Metalworking, these occupations have been cut from the critical list: blacksmiths and hammersmiths, boilermakers, loftsmen, industrial maintenance mechanics, millwrights, model makers, molders and coremakers, sawsmiths.

Still on the critical list: machinists, aircraft and engine mechanics, die setters, professional engineers, instrument repairmen, patternmakers, tool and die makers and designers, and apprentices in these trades.

To rate a deferment, a worker with a critical occupation must be employed in an essential industry. This listing has been cut, too. These metalworking fields are still listed: aircraft production and maintenance, ship and boat engineering, ordnance production and maintenance, and manufacture of precision instruments, electronic and communication equipment.

If the administration's controversial Military Reserve Plan—a modified version of UMT—is enacted this year, the listing of critical occupations and essential industries will also serve as basis for exempting veterans from organized reserve training.

The proposed Reserve Program would require at least three years of such training after completion of active duty.

GAW no goal for CIO-USA . . .

The Guaranteed Annual Wage won't be a demand in the steel industry this year. CIO Steelworkers President David J McDonald rules out the GAW as a bargaining issue for 1955 with the comment: "We follow complete adherence to collective bargaining agreements." This year's contracts between the steel industry and the 1.2-million member union call for re-opening on wages only and McDonald says that's all they'll talk about.

This rules out a chance that the union president will request that the companies talk about the GAW—which they could do if both sides agree. It's also an indication of the good relations between McDonald and the industry leaders—emphasized by their joint visits to the steel plants.

McDonald could change his mind. But by basing his position on the sanctity of a contract, this seems highly unlikely—even if the United Auto Workers manage to win some sort of GAW.

CIO-AFL merger and Metalworking . . .

The CIO Steelworkers decision to sign the no-raiding agreement ended the last major CIO holdout from the AFL-CIO pact which bars signators from taking each others' members. McDonald signed after assurances that his troubles with some AFL unions could be ironed out. He expects all jurisdictional disputes to be cleared up when the AFL and CIO complete their merger plans—probably in the fall.

One of the first achievements of the merger will probably be the amalgamation of the Steelworkers and the AFL Aluminum Workers. McDonald says he expects there'll be a team-up of the rival unions but, in effect, it would be the AFL union going into the much larger CIO affiliate, which now claims some 20,000 aluminum workers.

Also, the Steelworkers, as participants in the no-raiding pact, will automatically end many organizing disputes with the AFL Machinists union. These rivals have frequently clashed over members, since both claim jurisdiction over metalworking jobs. The Machinists had wanted a separate peace pact with the steel union, but this won't be necessary now.

The Machinists union, which has pushed the unity move as hard as any affiliate, is still seeking separate pacts with other unions, because the merger won't end all jurisdictional troubles. Currently, Machinist president Al J Hayes is negotiating with the AFL's Operating Engineers, Textile Workers, Electrical Workers and Iron Workers.

IN this cost-conscious era of close competition, there is a constant search for methods to reduce manufacturing costs. One way this is being accomplished by manufacturers of refrigeration equipment . . . is by making full use of the Microhoning process on vital functional surfaces of parts such as the bearing plate, crank case, main frame, front head casting, connecting rod, cast-iron housing, cylinders, pistons, and various small bushings.

What is Microhoning and how does it reduce manufacturing costs?

Microhoning is an abrading process that combines stock removal, geometric accuracy, size control and surface finish into one automatic operation. The rotating and reciprocating, automatically-expanding tool self-dresses its abrasives through its own motions, while faithfully duplicating the required surface finish.

The savings are in time, effort and equipment required to obtain comparable results by any combination of other means. Why not have a Micromatic Field Engineer discuss with you the advantages of Microhoning in your processing plans?

Write today for
Cross-Hatch
Vol. 6—No. 4

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVE., DETROIT 38, MICHIGAN

MICROMATIC HONE CORP.
MICRO-MOLD MFG. DIV.
Boston Post Road
Guilford, Connecticut

MICROMATIC HONE CORP.
2205 Lee Street
Evanston, Illinois

MICROMATIC HONE CORP.
1535 Grande Vista Avenue
Los Angeles 23, California

MICROMATIC HONE LTD.
330 Grand River Avenue
Brantford, Ontario, Canada

MICROMATIC HONE CORP.
MICRO-MOLD MFG. DIV.
231 So. Pendleton Avenue
Pendleton, Indiana

REPRESENTATIVES: Allied Northwest Machine Tool Corp., 103 S.W. Front Ave., Portland 4, Oregon • Mason Machine Tool Company, 415 So. Second East, Salt Lake City, Utah • Tidewater Supply Co., Charlotte 4, North Carolina
Perine Machinery & Supply Co., 1921 First Ave., South, Seattle 4, Washington

REPRESENTATIVES IN ALL PRINCIPAL COUNTRIES

Detroit . . .

If you aren't sick unto death . . .

of the guaranteed annual wage and all its implications, you might mull over a few of the more imposing sticklers labor negotiators will face within a couple of weeks when bargaining is due to begin at Ford and General Motors.

If GAW as the union demands it is finally accepted, how much time would pass before it could be put into practice in all states where auto plants are located?

Certainly some legislative revision would be required, since some states prohibit payment of unemployment compensation to jobless workers who have other income sources (although the legal department of one major auto maker can find no instance where such laws have ever been tested).

Are GAW payments—or jobless pay—to be subject to federal income tax?

How much is GAW going to cost a company? Nobody can tell for sure now. The reserve trust fund that the CIO United Auto Workers union seeks might cost in the area of 20¢ an hour—a figure arrived at by *Detroit Labor Trends*. This figure seems to have been accepted by union and management sources alike as being as valid as any estimate. That sum would simply set up the "kitty," however—the basic treasury out of which would come guaranteed pay. Any payments a company would have to make to laid off workers would be in addition to that (to keep the trust fund up to a specified minimum) and total annual cost to a company could only be determined after actual experience.

Who is to be laid off first, the high or low seniority worker? If the high seniority worker stays on while workers with less service go home, he may well resent the fact that he has to work for wages while others do not. Or, if the whole seniority system is to be upset (UAW says not) by sending high seniority workers home when there isn't enough work to go around, then who can blame a company if it rebels because production lines would be manned largely by green help?

What about defense production? If the country should go into another Korea-Type war and the government should call on the auto industry for higher volumes of defense equipment, the industry most certainly would have to hire thousands of new workers.

When contracts were fulfilled or cancelled, would auto makers—who would have no control over contract duration—then be obliged to pay wages to defense workers who would be laid off because companies couldn't absorb them in civilian operations?

As this went to press . . .

GM President Harlow Curtice was scheduled to deliver a reappraisal of the 1955 car and truck market as he and GM market analysts see it. Substance of his remarks: this can be the biggest passenger car year in history.

The domestic market alone, Curtice predicted, could absorb 7.5-million cars and trucks, and unit production—including Canada and vehicles for export—could total a stupendous 8.3-million units. This would all be possible, he said, "provided we continue to enjoy labor peace."

An accounting was due. Curtice earlier predicted a domestic market of 6.8-million cars and trucks, and a unit total, including Canada and for export, of 7.6-million. Production to date, however, has been running far ahead of that projection. (March auto output, in fact, will equal an annual rate of over 9-million units.)

"Ward's Automotive Reports" figures that first quarter production of cars alone will total 2.1-million units—almost half again as many as were built in the like 1954 period, and well in excess of the previous quarterly record of about 1.9-million cars built in 1950's third quarter.

Curtice's estimate is by far the most optimistic yet offered by an auto executive. One other large company is currently estimating a car market of slightly more than 6.1 million; another hedges a bit and says 6.5-million to 7-million cars, trucks and buses will be built and sold.

Curtice estimate, colossal as it may seem, cannot be scoffed at: GM executives, backed up by some of the most adroit marketing experts anywhere, have established themselves as Detroit's most reliable crystal-ball gazers.

Chrysler's expansion program . . .

is coming to a boil. Its Chrysler Division expansion in Detroit led the parade, followed by an announcement that an 800,000-sq ft automatic transmission plant will go up on 150 acres near Kokomo, Ind. Now comes Plymouth's move into Chrysler's Mound Road-Detroit plant, where aircraft parts previously were produced.

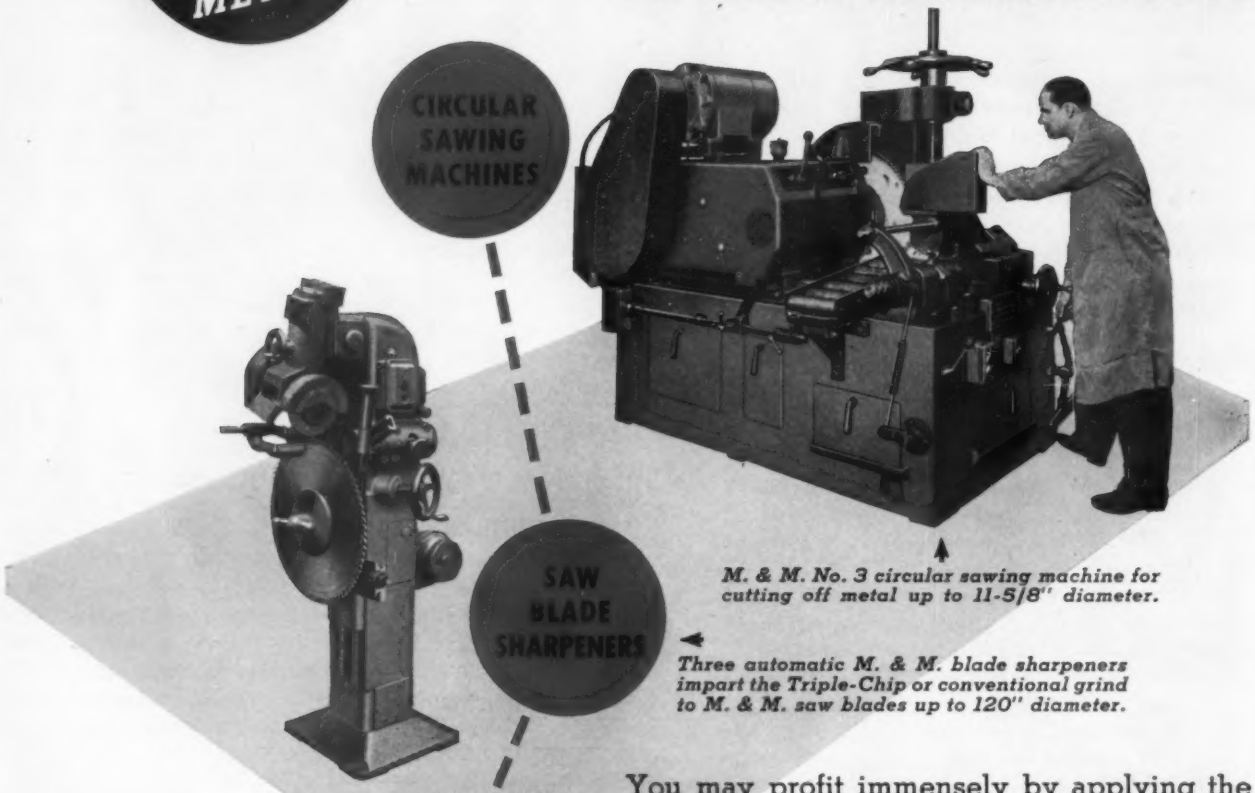
The plant will produce V-8 engines, increasing Plymouth's capacity by 300% over current volume.

The plant, which J P Mansfield, Plymouth president, says will be as advanced—equipmentwise—as any engine plant in the industry, will cost upward of $50 million to make ready for production.

Chevrolet engineers have a gadget . . .

in process that would link an auto accelerator and brake to one pedal. Idea would be to reduce motorists' brake reaction time. When depressed, the pedal would perform as does a conventional accelator pedal. When released, it would probably actuate power brakes.

THE Triple-Chip METHOD IS A *Triple-threat* TO HIGH CUTTING COSTS



M. & M. No. 3 circular sawing machine for cutting off metal up to 11-5/8" diameter.

Three automatic M. & M. blade sharpeners impart the Triple-Chip or conventional grind to M. & M. saw blades up to 120" diameter.

M. & M. saw blades cut any machinable metal. Cut-off blades: segmental — 11" through 120" diameter; solid — 8" through 20" diameter. Slitting saws — 3" through 8" diameter.

You may profit immensely by applying the M. & M. Triple Threat to *your* cut-off costs. Machine, blade, and grinder, made by the first company to build all 3, often effect phenomenal savings, as proved by detailed case studies. *Just such a study of your job is yours for the asking.* We offer you an unmatched experience in the sawing of metal, ferrous or non-ferrous, titanium to magnesium, from 1/4" to 43" diameter.

THE MOTCH & MERRYWEATHER MACHINERY CO.

MACHINERY MANUFACTURING DIVISION

CLEVELAND 13, OHIO

Builders also of Production Milling, Vertical Turning, Automatic and Special Machines

Machine Tools . . .

26 huge boring mills for Russia . . .

British government has given permission for shipment to Russia of 26 huge 8-inch floor-type horizontal boring mills to be made by William Asquith Ltd.

Robert Asquith is reported to have secured an order for these machines when he was in Moscow with a British trade delegation early in 1954. At the time that he took the order, this type of machine was on the blacklist for delivery behind the iron curtain.

Since then, in the modification of the rules for goods shipped to eastern Europe, the big horizontal boring mills had been put on the No. 2 list. That meant that they could be shipped at the discretion of the government, provided that the number was not excessive.

Washington protests to London . . .

The Department of Commerce in Washington is making vigorous representations to London against the decision to allow so many of these machines to go to the Soviet.

Only 25 of these machines have been produced in this country since 1946, according to Washington advices. Eleven of them were shipped to Europe.

American builders produced and shipped 16 of them to Russia in the period from 1938 to 1945 when Russia was our friend and military ally.

Washington feels that horizontal floor-type boring mills of such size are strictly strategic machines that will be used by Soviet industry to produce military goods. Hence London should reverse its decision to allow shipment.

British authorities are further reported to look favorably upon helping to finance expansion of Asquith's productive capacity for the building of these machines, which must be delivered within the next three years.

Government financing would be done on the basis that the additional capacity in elephant tools would be of value to British defense production.

Rents increased on government tools . . .

Rental rates on military-owned machine tools have been officially boosted by the Defense Department.

The new rates are based on age. Machines purchased new by the government since 1950 will carry a rent of 2% a month of the acquisition cost.

The rate will be 1.5% on machines bought from 1942 to 1949, and 1% on machines dating back before 1942. Former rent was 1% a month.

There is some doubt in Washington circles, however, whether the new rates will mean much, because of loopholes in the new regulations.

ODM approves one lease, vetoes two others . . .

Office of Defense Mobilization has approved the lease of 18 idle Army-owned machine tools for non-defense use to the McGill Mfg Co, Valparaiso, Ind.

Equipment leased by McGill is part of a tool "package" partially owned by the company and formerly used to machine roller bearings for Army combat vehicles. The lease is subject to McGill's agreement to maintain its own machines as part of the defense package.

At the same time that ODM gave its blessing to the McGill proposal, it disapproved similar deals involving General Motors' Allison Division at Indianapolis and the Rheem Mfg Co at Houston, Tex. Both of these projects, amounting to 36 pieces of equipment worth $490,000, had already been okayed by Defense Department officials.

No reserve machines to come from Europe . . .

No reserve machine tools for the government's mobilization program will be bought in Europe, according to Washington reports. An official in a high echelon at Pentagon is responsible for this policy statement.

This policy question had been raised by the government's recent action in permitting agencies to buy abroad if foreign suppliers put in a bid of more than 6% under any U S supplier.

At least one Swiss machine tool builder has been pushing hard to secure an order for horizontal optical jig borers as part of the Air Force's $84 million reserve machine tool program.

This builder points out that no such jig borer is made in this country and would not be available should an emergency arise. However, 25 to 30 of these machines could be supplied within a 12-month period for the reserve program.

The Swiss builder has offered to warehouse and maintain the machines in this country after delivery.

Navy is reported about ready to begin placing orders for some $40 million of metalworking production equipment. Just how much of it is machine tools is not known. But presumably the $14 million in the reserve machine tool buying program is included.

Niles-Bement-Pond deal with Bell is off . . .

The contract between Belco General Corp and Niles-Bement-Pond Co for exchange of Bell Aircraft stock and cash for shares of Niles stock expired March 1. Penn-Texas Corp had obtained a temporary injunction halting the proposed deal. A H d'Arcambal, Niles president, told stockholders in a letter that main objection of Penn-Texas to the contract was "that it interfered with the plan of Penn-Texas to obtain control of your company."

STEP UP CUTTING TOOL PERFORMANCE with a PRATT & WHITNEY CUTTER and RADIUS GRINDER

REDUCE
TOOL COSTS

INCREASE
NUMBER OF PIECES PER GRIND

LENGTHEN
TOOL LIFE

CUT
MACHINING TIME

IMPROVE
WORK QUALITY

THIS VERSATILE CUTTER GRINDER GRINDS THEM ALL . . .

- RADII, ANGLES, TANGENTS
- STRAIGHT or TAPERED FLUTES
- SQUARE, RADIUS and BALL ENDS

ECONOMICALLY – ACCURATELY

2 SIZES —— TYPE R-6: Grinds Flute Lengths to 4½". Accommodates B&S Taper Shanks No. 5-7-9.

TYPE R-8: Grinds Flute Lengths to 10". Accommodates B&S Taper Shanks No. 5-7-9-10-12.

THE MACHINE TOOL SHOW
CHICAGO, ILL.
SEPT. 6-17, 1955
INTERNATIONAL AMPHITHEATRE

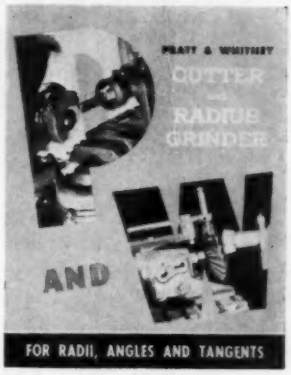
SEE US AT BOOTH 1219

MODERNIZE with PRATT & WHITNEY REPLACE FOR PROFIT

GRINDS THEM ALL . . .

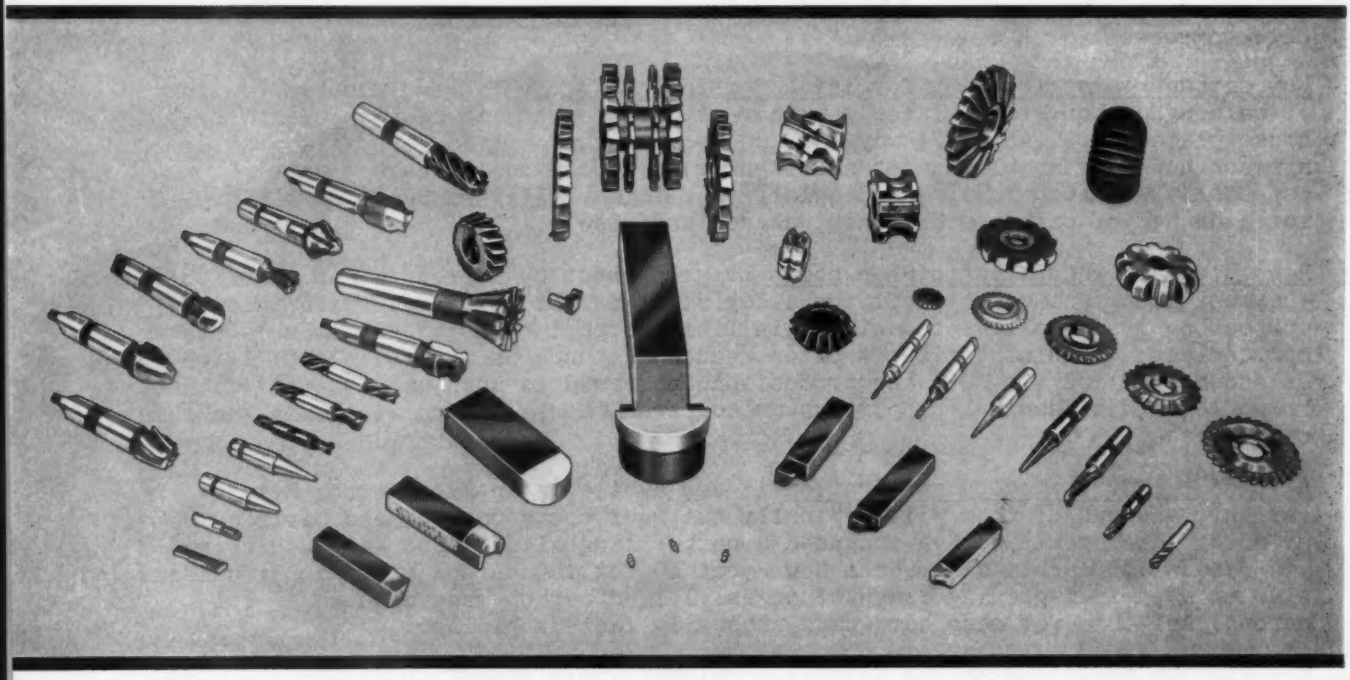
STOCK or SPECIAL

End Mills • Milling Cutters • Keller Cutters and Tracers • Lathe, Planer and Shaper Form Tools • Thread Milling Cutters • Miscellaneous Tools



SEND NOW FOR COMPLETE INFORMATION

Write on your Company Letterhead for Circular No. S455.



TO SERVE YOU BEST FOR ALL YOUR NEEDS . . .

. . . all Pratt & Whitney equipment is made available to you only through our *Factory-Direct Representatives*. Each of these men is a specialist in his own line . . . fully qualified by training and experience to recommend the best for your own specific needs. This man is ready to serve you . . . call him at the P&W Branch Office located conveniently near you.

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY

WEST HARTFORD 1, CONNECTICUT, U.S.A.

BRANCH OFFICES . . . BIRMINGHAM • BOSTON • CHICAGO CINCINNATI • CLEVELAND • DALLAS (The Stanco Co.) DETROIT • HOUSTON (The Stanco Co.) • LOS ANGELES NEW YORK • PHILADELPHIA • PITTSBURGH • ROCHESTER • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., WEST HARTFORD

FIRST CHOICE FOR ACCURACY

SINCE 1860

MACHINE TOOLS • CUTTING TOOLS • GAGES

(Advertisement)

What's New

IN STEEL FROM STOCK

In the news today are many developments of interest to those who specify, buy or work with steel. Ways in which you can raise efficiency and lower costs in your operations may be suggested by the following summary.

7½¢ per lb. saving on stainless sheets. Rising nickel prices are bringing back Type 430 straight-chrome stainless for mild corrosion applications. 7¼c price advantage is real inducement and Type 430 may also be getting consideration as insurance against any shortage of nickel-bearing types. Ryerson has anticipated renewed demand by stocking Type 430 sheets in many gauges and sizes. Technical data on request.

Low carbon plates for easy forming and welding. If you've had trouble forming or welding carbon steel plates remember—steel produced to most popular warehouse plate spec. (ASTM A7) may have up to .35% carbon. To meet this problem, Ryerson now carries plates (⅝" and lighter) produced to low carbon spec. especially for good forming and welding qualities. Also on hand: more sizes—more tonnage of carbon steel bars, shapes and sheets.

Revolutionary reduction in shop costs brought about by Ryerson's New Rycut 50 is the most important news to hit the alloy steel market in years. With this new .50 carbon leaded alloy, reductions in finished part costs of 25% or more are commonplace. Machining time is often reduced as much as 75% . . . tool life extended from 100% to 300% and production increased as much as 200%—all without known loss in mechanical properties as compared with standard alloys in the same carbon range.

A leaded alloy for every application is now available in the Ryerson Rycut series. Any one of them will typically cut your costs on machined parts by 25% or more. Use Rycut 20 when you need a carburizing alloy. Use Rycut 40 when you need a .40 carbon alloy, and New Rycut 50 for .50 carbon alloy applications. Also on hand in a growing range of sizes: leaded carbon-manganese bars—low carbon, suitable for case hardening, unusually fast machining.

New Ryerson stainless solves welding problems. Both stainless sheets and stainless plates in Type 304 L and Type 316 L have recently been added to the nation's largest stainless stocks—at Ryerson. In applications involving welding and stress relieving, where carbide precipitation may occur, these extra-low-carbon stainless steels can often replace expensive stabilized types.

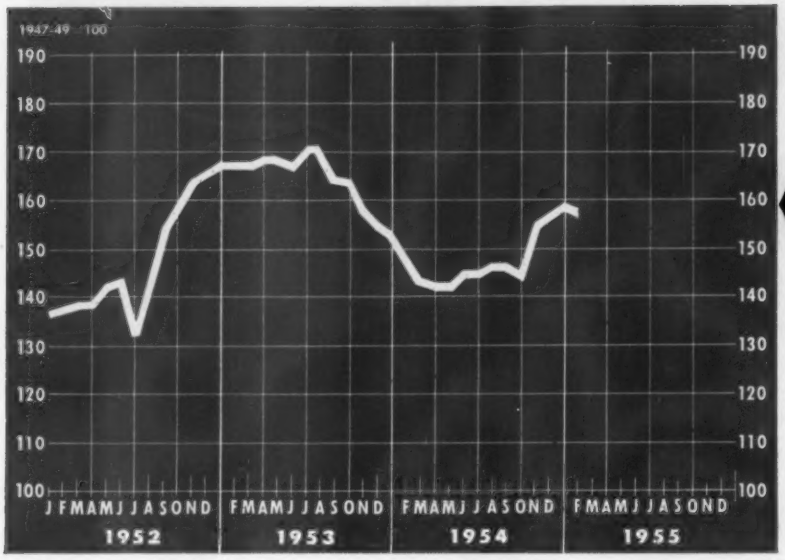
Save 30% with Type 302 ornamental stainless tubing. Another recent addition to Ryerson stocks, this tubing is priced substantially below comparable stainless tubing for other than ornamental purposes. Yet it is more than satisfactory for many applications such as in restaurant and hospital equipment, etc.

Same day deliveries . . . tighter quality control. On as high as 98% of all regular warehouse orders, Ryerson is now cutting and shipping steel the same or following day. And this steel is now protected by a whole new set of quality control standards. As evidence—we can furnish a certificate of analysis or a mechanical properties report for every pound of steel shipped.

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC. PLANTS: NEW YORK • BOSTON • PHILADELPHIA • CLEVELAND
CHARLOTTE • CINCINNATI • DETROIT • PITTSBURGH • BUFFALO • CHICAGO
MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Gaging Metalworking . . .



Production Index

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	FEB '55(*)	JAN '55(p)	DEC '54(r)	JAN '54
Total index	**157**	**157**	**155**	**154**
Machinery	**121**	**120**	**130**	
Electrical Machinery	**188**	**192**	**169**	
Autos	**152**	**143**	**119**	
Other Transportation	**287**	**286**	**301**	
Other Metalworking	**129**	**129**	**130**	

(*) Estimated (p) preliminary (r) revised

AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION

First quarter output very high . . .

First quarter metalworking production is exceeding expectations by a wide margin. March is just as good as January and February, both of which showed surprising strength.

Automobile production, now at an all-time peak, has been the biggest single factor in making Metalworking's performance notable since the first of the year. Detroit's apparently insatiable demand for raw materials and components is being felt far and wide throughout the nation.

Steel's output is a prime example. Not since the record-breaking days of 1953 have customers placed so much tonnage. Automotive orders head the list.

Copper and brass people tell much the same story as the steel mills. Job-shop die casters expect that their sales this year will hit the $400-million mark, compared with $268 million in '54. Increased use by the automobile industry is the main reason.

Parts plants working overtime . . .

The automotive phenomenon naturally has had a terrific impact upon parts makers. The experience of a leading company is typical.

Production in December was very high. January was off slightly, but February topped December. March will match or surpass the February volume.

Some parts plants are on a three-shift, seven-days-a-week basis to meet customers' needs.

Demand brisk for appliances . . .

Major domestic appliances have swept upward this year, perhaps not as spectacularly as automobiles but impressively just the same.

One maker of refrigerators, ranges and dishwashing machines reports 1955 sales running 35% ahead of last year. It expects the year's total to top 1954 by 18% or more. Another maker puts his January and February sales at 29% above the same months of '54.

Small appliances are doing well, with small gains over a year ago. But they do not match the performance of major appliances.

Farm machinery business better . . .

Farm tractor business is on the upgrade. A large manufacturer has increased output for the second time in recent weeks and has been adding a considerable number of production workers at its plants. This is the result of changeover to new models.

International Harvester's sales for three months ended January 31 were: farm machinery up 12% from year ago; farm tractors up 14%; motor trucks up 11%; industrial power products up 13%.

Malleable iron casters say that the pickup in orders from other than the automotive industry has been substantial. As a result, a six weeks' backlog has been built up quickly, with users exerting pressure for deliveries. Most shops are running two shifts five days a week. Steel casters have had a similar experience.

Industrial heating equipment spurts . . .

Industrial heating equipment orders were just under $5 million in January, an increase of 37% over the same month the previous year.

Machine tools sales have been at the highest level in a year and a half.

Even the railroads are getting ready to do much-needed track maintenance work, several carriers having asked for rails for March and April delivery.

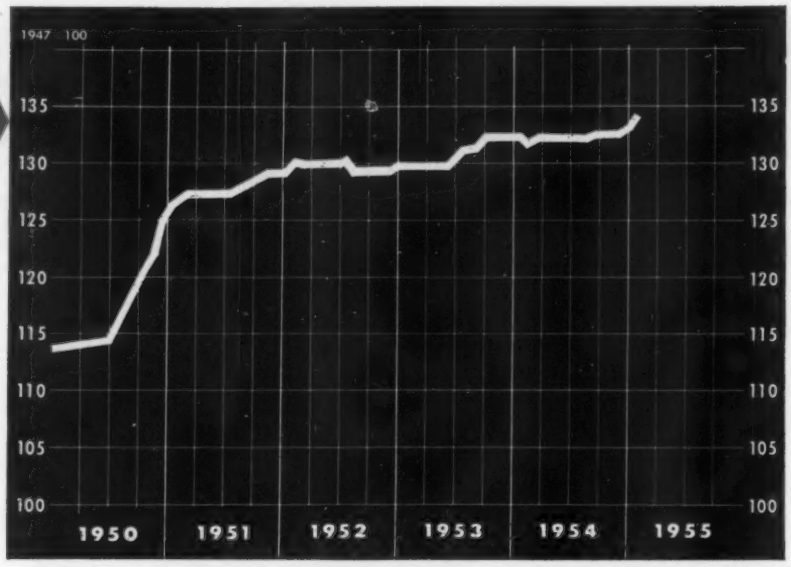
Rush of customers to place steel orders is verging on boom proportions.

Gaging Business . . .

Price Index

	FEB '55(*)	JAN '55(p)	DEC '54(r)	JAN '54
Total Index	**134.2**	**134.0**	**133.8**	**132.9**
Metalworking Machinery		**145.1**	**143.9**	**141.8**
Other Machinery exc. Electrical		**137.9**	**137.6**	**137.4**
Electrical Machinery		**132.0**	**132.0**	**132.0**
Fabricated Metal Products		**130.7**	**130.7**	**129.3**

(*) Estimated (p) preliminary (r) revised



AMERICAN MACHINIST INDEX OF METALWORKING PRICES

Business rise confounds the experts . . .

It has taken 1955 only two months to confound most business forecasters. Instead of rising moderately, business activity has shot ahead at an even faster pace than during the Christmas buying season.

Take the gross national product. It is now running at a seasonally adjusted rate of $370 billion for the year. It was not expected that this figure would be reached before the year's end.

Industrial production is hovering around 133 for the first quarter (1947-1949=100 on Federal Reserve Index). This is nine points higher than it was in the corresponding quarter a year ago.

Detroit sparks the boom . . .

Industry's spectacular performance thus far in '55 is traceable directly to Detroit, just as is the gain in Metalworking itself. The automobile boom, breaking all records for mid-winter, has been felt in many non-metal products, such as glass and upholstery fabrics.

That is why gross national product is climbing so fast. Even economic adjustments for seasonal slack magnify rather than minimize the boom.

Civilian orders replace defense work . . .

Manufacturers who have done a large amount of defense work since Korea report that their government orders represent a constantly dwindling percentage of their total production.

Many companies estimate that defense output now is only about 10% of their total, whereas it was 20% or more a year ago.

Most contractors, anticipating this loss, have dug up other work and enlarged their civilian business.

Americans receive record income . . .

No figures are yet available for this year, but in December Americans received a greater income than in any previous month in history. The year 1954 set a record too for personal income; and more money was left after taxes. It would not be surprising if the first quarter put 1954 in the shade.

Straw-in-the-wind: Sears, Roebuck & Co's January sales set a new high for that month.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-49 = 100)*	139.1	139.0	121.3
Steel ingot production (thousand tons)	2,172	2,191	1,686
Electric power output (million Kilowatt hours)	9,725	9,912	8,396
Production of automobiles and trucks	193,233	196,644	145,980
Engineering construction awards (*Eng. News-Record*, millions)	$373.2	$312.2	$208.1

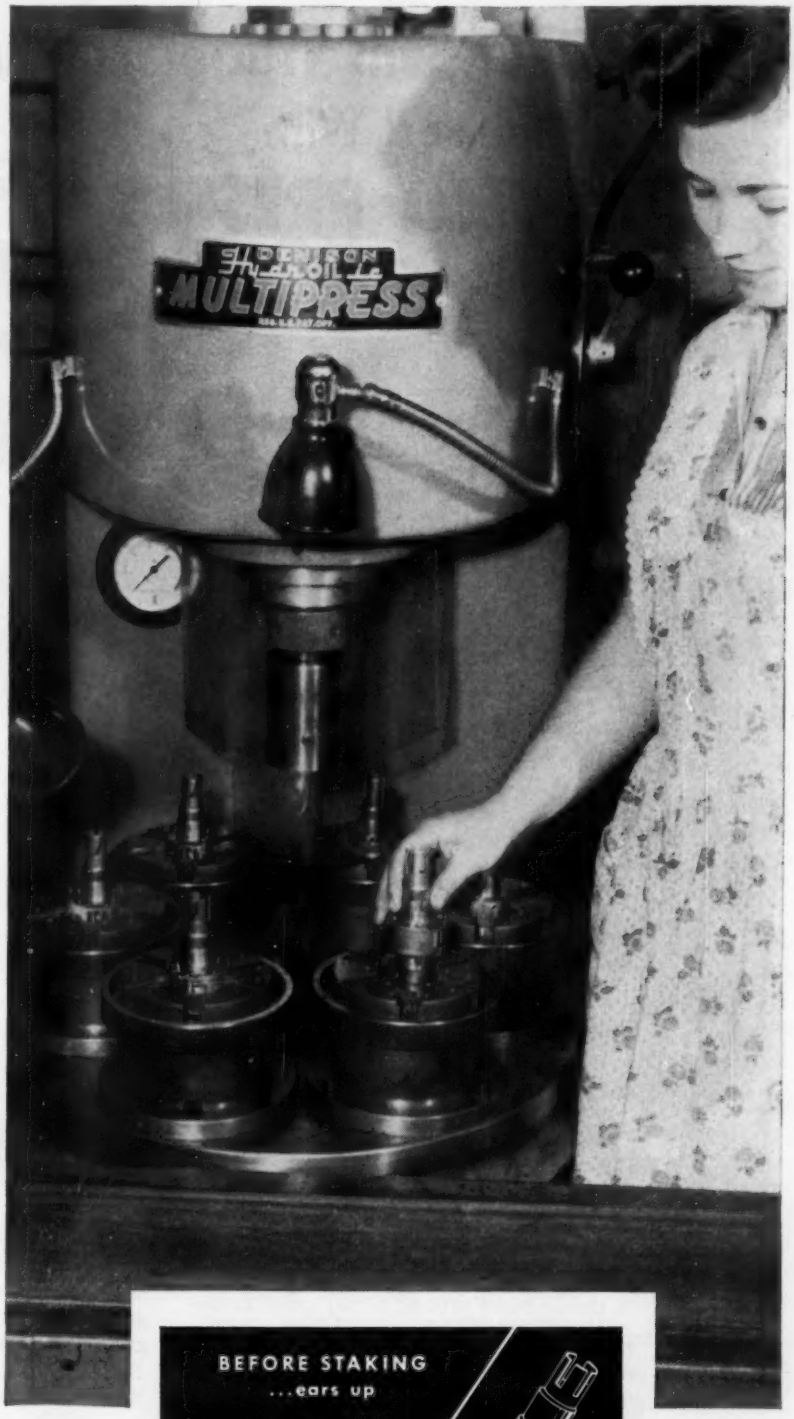
MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators sales (thousands of units)	176	191	140
Vacuum cleaners sales (thousands of units)	238	263	216
Washers sales (thousands of units)	308	339	238
Household electric ranges sales (thousands of units)	79	84	73
Radio production (thousands of units)	1,071	800	1,061
Television production (thousands of units)	859	921	561
Gear sales index (1947-49 = 100)	116.7	152.1	144.9
Foundry equipment new orders index (shipments, 1947-49 = 100)	61.4	147.5	149.4

* Seasonally adjusted

...another cost-saving idea from DENISON

Stakes 475 assemblies an hour with DENISON MULTIPRESS®



Job. Stake sub-assembly of door-lock retractor by pinning back 4 ears.

Method. Load sub-assemblies from conveyor line to Denison Index Table. Table automatically indexes sub-assembly beneath hydraulic ram of Denison Multipress. Accurately controlled single stroke of hydraulic ram pins back 4 ears. Results are uniform. Production . . . 475 units an hour.

Your Benefit. If your work calls for staking, riveting, forming, crimping or trimming, Denison can show you how to simplify operations, speed production and cut costs. Ask a Denison Engineer to study your job and show you how. Write.

THE DENISON ENGINEERING COMPANY
1164 Dublin Road, Columbus 16, Ohio

DENISON HydrOILics

HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

Caterpillar-Built Tractor Equipment
Speeded With
STEELWELD PRESSES

Caterpillar DW20 Tractor with W20 Wagon.

Tractor equipment parts produced on this and other Steelweld Presses at Caterpillar are of various thicknesses and require many different bends. This is a Model K5-10 Press rated at 320 tons.

THE ease and speed with which dies can be changed on Steelweld Presses and necessary adjustments made have proven a big asset in obtaining high production of a great variety of steel parts for scrapers, rippers, bulldozer blades and wagons at the Joliet Plant of Caterpillar Tractor Co.

Because of simplicity of Steelweld operation, the parts can be turned out quickly and accurately. The heavy quality construction, including solid one-piece frame, finest electrical equipment and automatic oilers for lubrication of all bearings, keep Steelweld Press maintenance extremely low and assure uninterrupted production.

GET THIS BOOK!
CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.
1449 EAST 281ST STREET, WICKLIFFE, OHIO

STEELWELD
BENDING PRESSES
BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

"Sweet Little Business"

Everybody wants to help small business. Washington's solicitude about it is something to behold!

Hardly a week goes by without at least one Congressman viewing with alarm the perilous position of small business and proposing that a new agency be created to aid it.

Just what is meant by small business is not always clear. One Washington definition puts it as any company employing less than 500 workers. Another makes it a relative sort of thing; a manufacturer with 3000 men might be small business in the automotive industry, but in many other industries would be classified as big business.

There is one segment of industry which, by any definition, constitutes small business—shops with less than 100 workers. In Metalworking alone, there are over 45,000 such shops.

These shops cover a tremendous range. They go all the way from so-called "alley shops" to one-story, modern plants using the latest production methods.

They produce almost every conceivable kind of metal product, from pins to huge dies and machinery. They are as vital to our national security and welfare as General Motors and General Electric.

It is hardly news that the mortality of small companies is much greater than that of large companies, whether it be in Metalworking or any other industry. Not all of the 45,000 small metalworking shops will be able to survive and prosper.

The national interest demands not only that these shops continue to operate, but that they grow. In that laudable aim, **all of Washington's attempts to care for and feed small business will be as nothing compared with what small business can and shou!d do to help itself.**

With this fact in mind, the following remarks are addressed to owners and operators of small metalworking shops:

Your problems differ from those of big companies. You are not so departmentalized as they are. You don't have their specialized management personnel; you probably take upon yourself the duties that they distribute among four or five men.

You have to make your dollar stretch farther. Your experiments are modest compared with their elaborate research and development work.

You have valuable assets, however. You are not bogged down by heavy overhead. You can make quick decisions and get speedy action because you are not burdened by "committee government."

You are a free agent to fuss around as you please with a promising new product and come up with one that can be made at low cost and for which there is a brisk market.

The truth is that you don't have to be big to be successful. You surely have had the experience of visiting a small, well-run plant with a good product that fills a real need. And you have come away saying to yourself, "What a sweet little business to own!" Perhaps you already have such a business.

If you want to run a prosperous small shop, you can put down one rule for sure: **You must keep an open mind receptive to new ideas and must constantly search for new and better ways of doing things.**

You must find the time to visit other shops, both big and little; to swap information on shop practices with others; to read technical magazines; to belong to your industry association and contribute to and gain from its collective strength.

You should welcome automation and adapt it to your particular requirements rather than viewing it as an ogre. **You won't reject any new techniques as being "only for the big fellows" until you look them over carefully and see whether you can use them in a modified form.**

If you will maintain this kind of alert, aggressive, intelligent attitude, you should do all right. You should be able to stand up competitively against anybody, regardless of size. And you won't need Washington's help. You will be the proud head of that sweet little business that many of us would like to own. And you will have the satisfaction of being an important part of American industry.

Burnham Finney

toolmakers prefer this

CINCINNATI shaper

Revco, Inc., producers of Food Freezers, state their toolmakers prefer using this 20" H. D. Cincinnati Shaper. They like the convenience of all controls located at the operator's position and the amazing speed of the electro-magnetic clutch and brake. They like the assurance provided by the 50 P.S.I. automatic lubrication. They like the very high accuracy obtained in shaping jigs and fixtures, drawing, forming and blanking dies.

Write for the new illustrated catalog N-6 on Cincinnati Shapers.

12 cubic foot Revco, one of many Food Freezer models built by Revco, Inc., Deerfield, Michigan

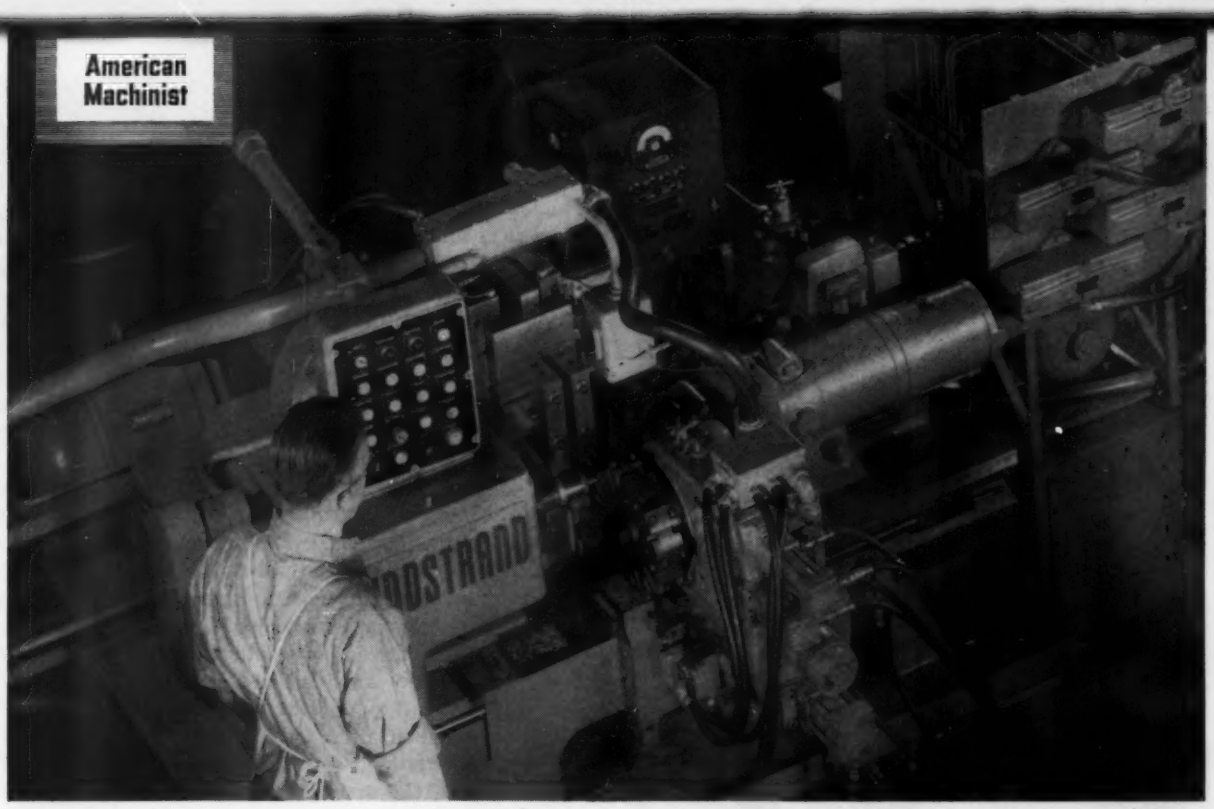
Cincinnati Electro-Magnetic Clutch and Brake and 50 P. S. I. Automatic Lubrication.

Photo courtesy Revco, Inc., Deerfield, Michigan

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES



Air gage and precision limit switches control all functions of this special automatic lathe tooled to turn diecast rotors for small induction motors. Machine cycles repeat continuously, with automatic compensation for tool wear and replacement of toolbits worn beyond preset limit, until all tools in drum have been used. Full cycle requires approx 17 sec. Similar lathes turn motor stators

Automatic Lathes Reset Their Own Tools

BEN C BROSHEER, associate editor

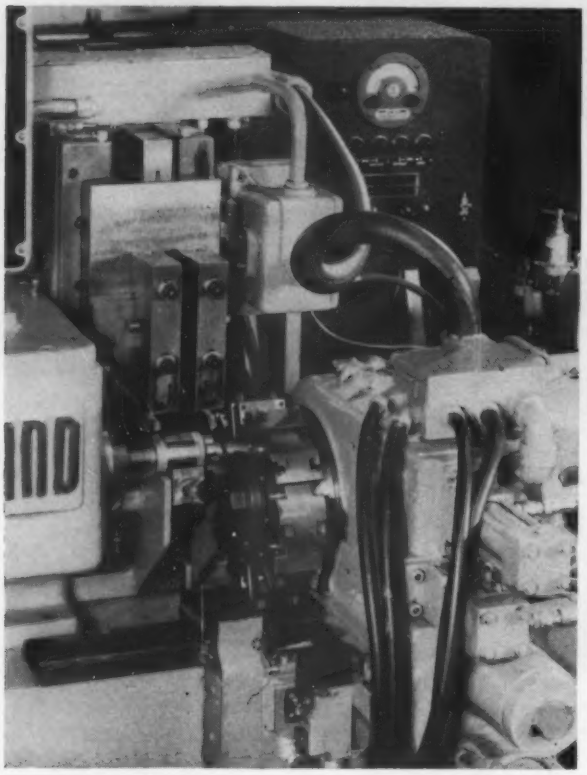
Mass production of small turned parts has taken another long step forward with the development of automatic self-checking lathes for turning small-motor rotors and stators. Each part is gaged before leaving the machine, and stops automatically are adjusted to compensate for tool wear. Then, when wear exceeds preset limit, sharp tools automatically replace dull tools

Self-compensation for tool wear and automatic replacement of tools worn to a predetermined limit have been built into a group of 10-hp automatic lathes developed by Sundstrand Machine Tool Co for turning the OD and chamfering the ends of rotors and stators used in fractional-hp induction motors.

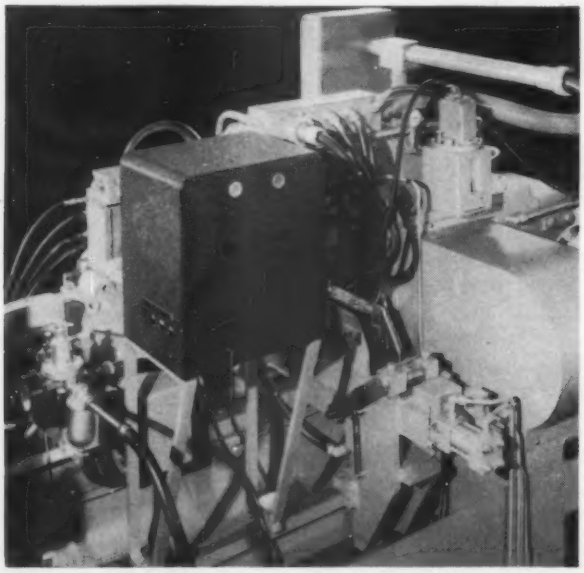
Now installed in a plant of a well-known maker of electric motors, these lathes can be operated for 5 to 8 hr without attention, except for an occasional check to make sure parts are being delivered to the loading mechanisms.

Long-sought by production and tool engineers in mass-production metalworking plants, self resetting of cutting tools in automatic machine tools to compensate for tool wear can be an important factor in the continuing battle to reduce production costs. Not only does it make possible greater efficiency by minimizing downtime for tool adjustment and replacement, but also it materially reduces the level of skill required for production operations involved.

While automatic checking of workpiece dimensions as they are machined, and automatic compensation for wheel wear, have been used for some time in cylindrical and centerless grinders, the lathes described here are among the first automatically loaded and unloaded units using single-point tools which gage the finished parts and automatically compensate



Ten pairs of carbide-tipped toolbits are precisely mounted in indexable drum carried on front slide. Drum turns one position under automatic control after indexable positive stop for front slide has been turned six times, to compensate for 0.0025-in. wear on cutting edge of finish-turning tool bit, then to bring the stop back to its original position



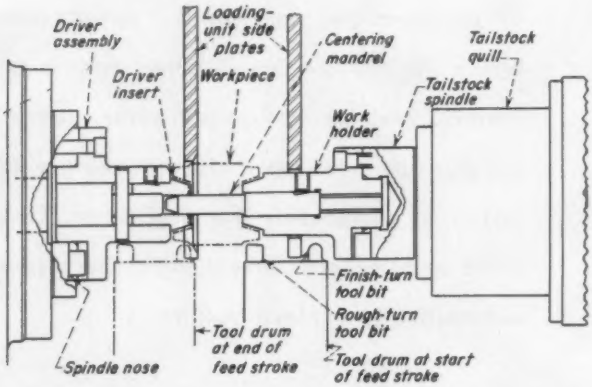
Air-gaging station is mounted in discharge chute of load-unload mechanism at rear of lathe. Hose from gage orifice leads to gage-control unit (black box) where pressure-differential electric switches determine whether part is turned within preset limits, or is under or over size, and adjusts or stops machine accordingly

for tool wear. The same principles are certain to be applied to other similar lathes in future, where production requirements justify the extra cost involved. And it is entirely possible that these part-checking and tool-adjustment features will be applied to other types of mass-production machine tools as well.

Air gaging is used in all of the lathes tooled to date for automatic inspection and tool resetting. Gage circuits incorporate pressure-differential switches to interlock the air systems with the electrical control systems of the machines. Three types of gaging units have been developed, two checking directly against the parts themselves, the third measuring the cutting edge of the finish-turning tool to determine whether edge wear has occurred. Other systems for accomplishing the same results will no doubt be developed in the future, as there is no apparent reason why electronic gaging systems should not work as well as the air systems employed to date.

Of equal importance is the development of means for automatically adjusting positive stops on tool slides, so compensation for tool wear can be accomplished quickly and accurately within the normal cycle time of the machine according to instructions from the gaging heads. Stepped, indexable stops, like those employed in the Sundstrand lathes described herewith, are sturdy, virtually foolproof, and easy to adjust for workpieces of different diameters. As now constructed, they provide 0.0005-in. radial adjustment of the tool slide for each index of the stop drum, thus achieving 0.001-in. reduction of the workpiece diameter. This adjustment is satisfactory where turning tolerance is fairly large (0.002 in. in the case of the rotors and stators being turned with the present machines), but may be inadequate when finer tolerances must be held. Means for finer adjustment of tool position undoubtedly can be devised when the need arises.

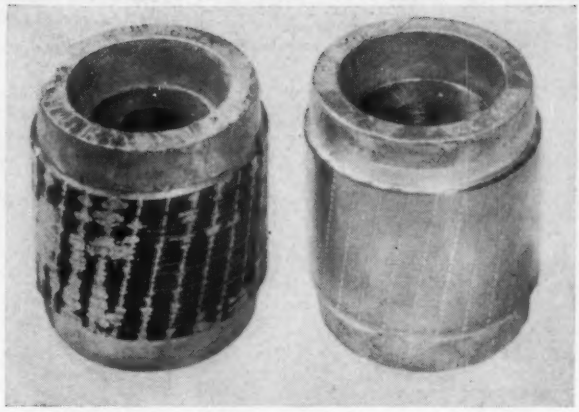
Also of importance to tool engineers is the development of the drum-type toolholder used on both the rotor- and the stator-turning lathes. This index-



Diecast motor rotors automatically are moved to and from spindle position by hydraulically-actuated load-unload mechanism controlled by limit switches and solenoid valves. Forward movement of air-actuated tailstock quill picks previously finish-bored rotor up on chrome-plated mandrel and forces it against hardened knife edges on face of driver insert while lathe spindle is stopped

able drum, as now constructed, carries ten pairs of rough- and finish-turning toolbits to insure an adequate supply of sharp tools for almost continuous operation. In each tool position, the carbide-tipped bits are spaced far enough apart so the roughing operation is completed before the finishing tool starts cutting. There are many operations where similar toolholders, indexable either by hand or automatically (as shown), can be applied to minimize the time a machine must be taken out of production for tool changes.

In the continuing race to reduce manufacturing costs, extensive developments in automatic machine-tool control and self-adjustment, like those described herewith, can be anticipated. Where production quantities justify the cost of such developments, the advantages of lower cost will lie ever more decisively with those metalworking plants which replace obsolete production units with new machines of modern design.



Simple changes in load-unload mechanism and positions of limit switches make it possible to use the lathe for induction-motor rotors from 2- to 5-in. OD and from approx ¾- to 1¾-in. lamination length. Rough rotor (left) is finish-turned (right) at 1000 sfpm with a pair of carbide-tipped toolbits, then is air gaged on OD

MACHINING CYCLE FOR SMALL ELECTRIC-MOTOR ROTORS

At the start of the machining cycle, a rough rotor is clamped on the mandrel, ready for turning. Then:

1. Operator presses cycle-start push-button, and front slide advances.

2. When front slide has moved forward against a positive stop, it closes a limit switch to (a) start lathe spindle, (b) start front-carriage rapid-approach and feed cycle to traverse rough and finish toolbits longitudinally along rotor to turn OD of laminations, (c) start overhead tool slide down, and (d) retract positive stop in rotor gage unit at rear of lathe. If a previously turned rotor is in gage unit when stop is retracted, rotor then will drop into a discharge chute leading away from lathe.

3. As overhead slide moves down in rapid advance, it (a) closes a limit switch to change rate of downward travel to preset feed rate, then (b) feeds to positive stop, and (c) closes second limit switch that permits a short "dwell" while two toolbits finish chamfering two ends of rotor, then rapid-returns overhead slide to a positive stop. This opens first two limit switches and closes a third, clearing overhead slide controls for another cycle. Meanwhile, front carriage continues feeding to end of stroke.

4. At end of carriage stroke it closes a limit switch to (a) stop lathe spindle, (b) retract front slide to original position, opening its forward limit switch and closing a rear limit switch to (c) rapid-return carriage to its starting position, and (d) extend positive stop in rotor-gage unit at rear of lathe. Completion of last two movements also closes limit switches to clear control circuits and reset them for next cycle of machine.

5. When front slide has been retracted and zero-speed switch indicates spindle has stopped, tailstock quill is retracted to its open position, and finish-turned rotor is left in forward end of tiltable arm in load-unload mechanism.

6. When tailstock quill is fully retracted, it closes a limit switch to tilt load-unload arm. This permits finish-turned rotor to roll onto discharge rails leading to rotor-gage unit at rear.

7. When rotor enters gaging unit, it trips a limit switch which (a) starts a timer, and (b) returns tiltable load-unload arm to its original position, loading a rough rotor to the spindle position as it returns.

8. When timer runs out, it extends tailstock quill to its forward position, locating and clamping rough rotor in turning position, on mandrel, and air-gage system signals controls for front slide to do one of the following:

A. If gaged rotor is undersize, machine is stopped.

B. If part is oversize, indicating wear on cutting edge of finishing tool bit, positive stop drum on front slide is indexed to next position. This allows front side to advance 0.0005 in. farther toward spindle axis on next cycle of machine. When a limit switch has indicated that indexing of stop drum has been completed, and piston carrying indexing pawl has been returned, front slide automatically is moved forward and lathe spindle is started to initiate a new cycle automatically.

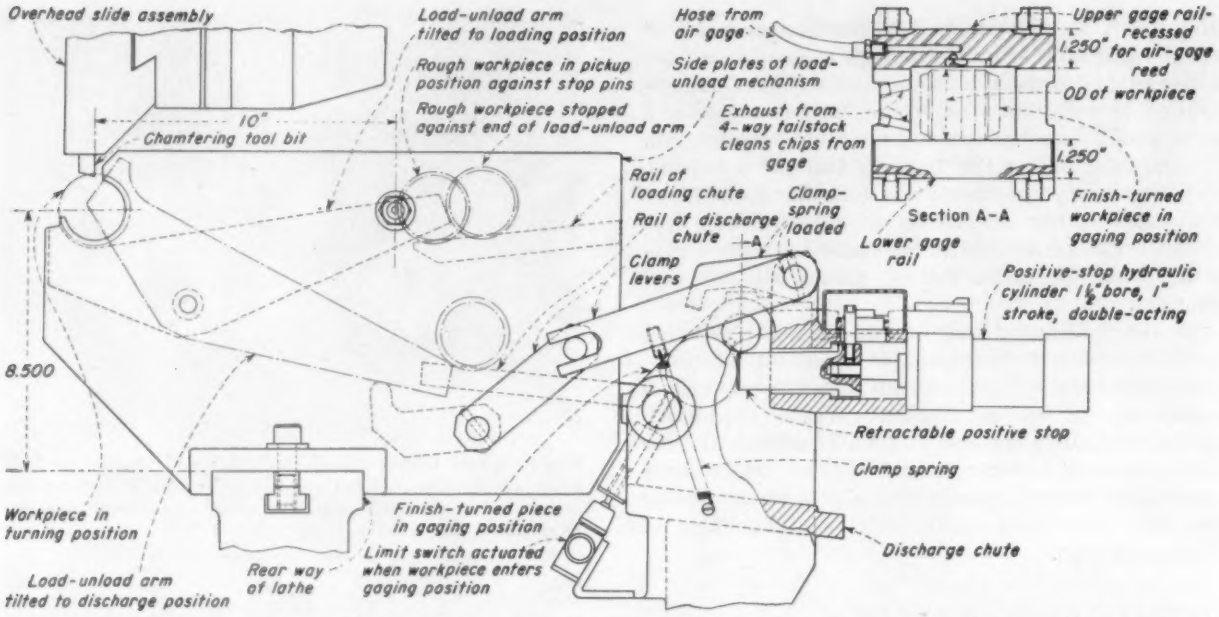
C. If rotor is within allowed limits, front slide moves in and spindle is started, initiating a new machine cycle. Control circuit of air-gage system includes a cycle counter that can be set to require gage head to call for a stop-resetting cycle (because part measures oversize) from two to as many as five times before resetting function is performed. This makes it possible to minimize possibility of a chip or bit of other foreign matter coming between workpiece and gaging reed, to cause an incorrect reading, and thus lead to more rapid use of toolbits than necessary. Use of this feature will depend upon limits of accuracy to which parts are being turned.

When positive stop drum in front slide has been indexed six times, a button on the positive stop drum trips a limit switch to (a) retract the lockpin holding the index plate of the tool-drum support unit, (b) extend piston of tool-drum index cylinder to turn drum to next position, (c) return lockpin to forward position, locking index plate, and (d) return piston of index cylinder to starting position. When a new pair of toolbits has thus been indexed and locked into cutting position, front slide automatically moves forward to initiate a new machine cycle.

When tool drum has been indexed ten times, as above, the lockpin enters a notch ⅛-in. deeper than the other notches in index plate, causing lockpin to trip a limit switch and stop the machine until the tool drum has been replaced.

PLEASE TURN PAGE . . .

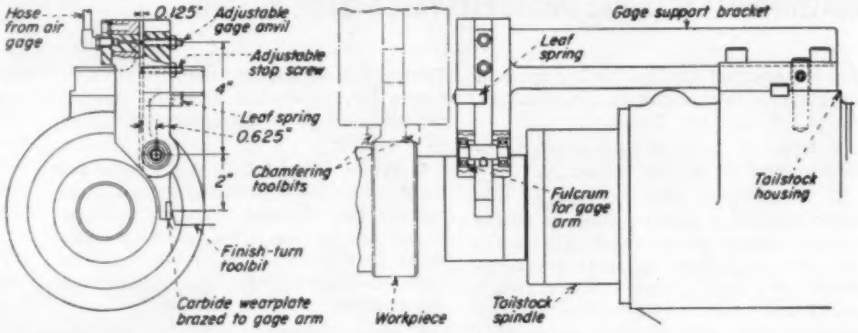
Automatic lathes reset their own tools . . . continued

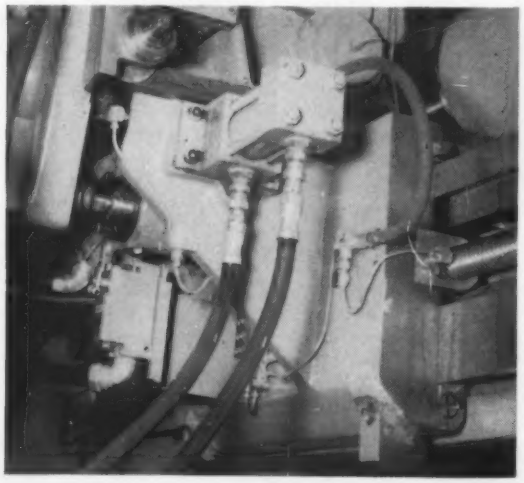

Overhead slide assembly
Load-unload arm tilted to loading position
Rough workpiece in pickup position against stop pins
Rough workpiece stopped against end of load-unload arm
10"
Chamfering tool bit
Hose from air gage
Side plates of load-unload mechanism
Exhaust from 4-way tailstock cleans chips from gage
Upper gage rail-recessed 1.250" for air-gage reed
OD of workpiece
1.250"
Section A-A
Finish-turned workpiece in gaging position
Rail of loading chute
Rail of discharge chute
Clamp-spring loaded
Lower gage rail
Clamp levers
Positive-stop hydraulic cylinder 1½" bore, 1" stroke, double-acting
8.500
Retractable positive stop
Clamp spring
Workpiece in turning position
Finish-turned piece in gaging position
Limit switch actuated when workpiece enters gaging position
Discharge chute
Load-unload arm tilted to discharge position
Rear way of lathe

Load-unload mechanism and gaging station are actuated with small double-acting hydraulic cylinders controlled with limit switches and heavy-duty solenoid valves interlocked with machine control circuits.

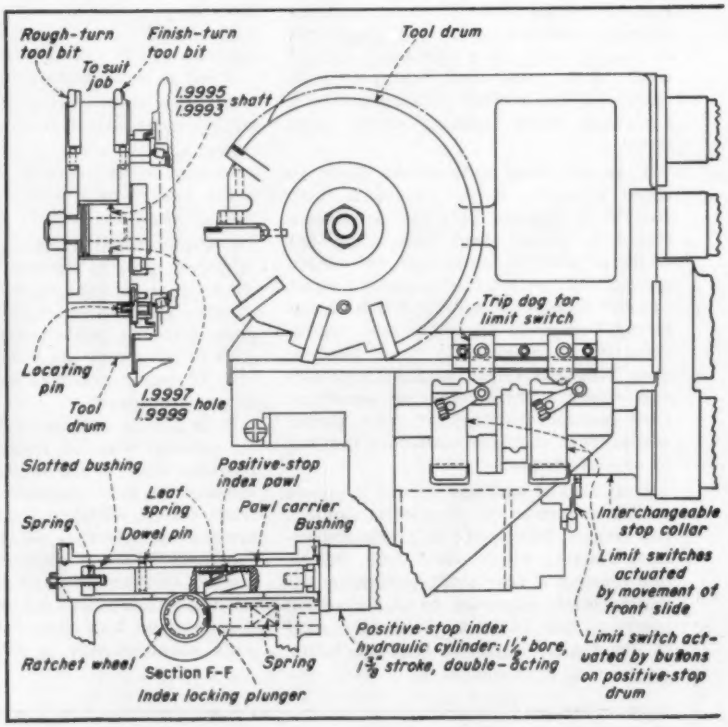
In gaging station, turned rotor is held in three-point locator formed by fixed lower gage rail, retractable positive stop and spring-loaded clamp arm actuated by tilting of load-unload arm

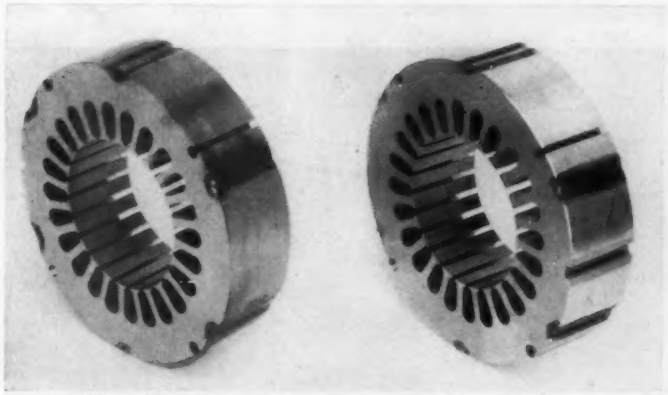
To permit unloading stator core from lathe spindle while OD is checked, and thus permit speeding up lathe cycle more closely to approximate production rate achieved with automatic self-resetting lathes used to turn motor rotors, Sundstrand engineers devised a means (right) for quickly checking wear on point of finish-turning toolbit while front slide and carriage are at start of turning position



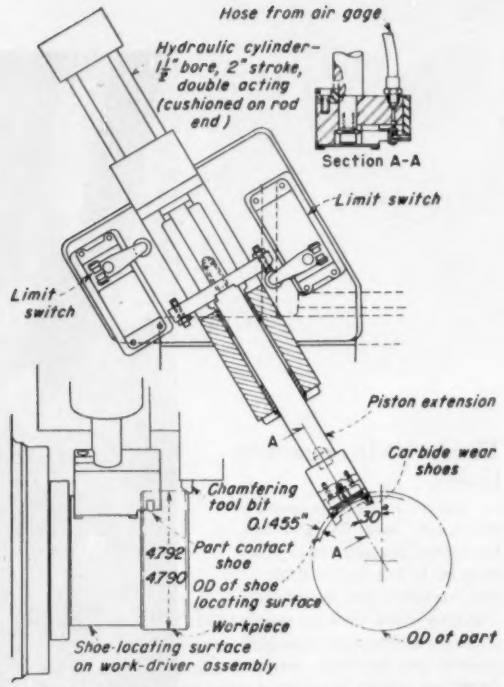


Indexable positive stop has five pairs of stop faces spaced 0.0005 in. apart so diameter of finish-turned workpiece can be reduced 0.001 in. each time stop is indexed to compensate for tool wear. Interchangeable stop collar on same rod has two stop pads which match pairs of stop faces on stop drum. Length of this collar determines diameter to which part is turned by lathe



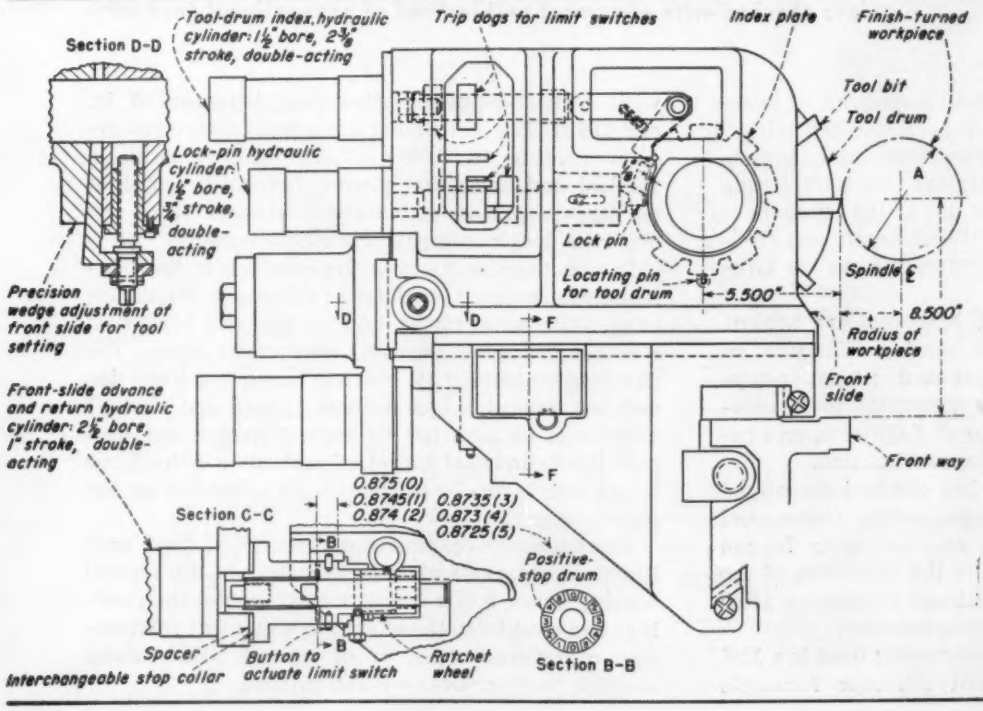


Because length is short compared with diameter, it is difficult to locate stator cores in gaging station like that used for checking rotor diameters. Therefore, in lathes tooled for rough- and finish-turning of these parts, automatic gaging is done either while stator still is clamped in turning position (sketch), or by checking tool wear by measuring directly against nose of finish-turning bit (sketch). Stators are 4.791-in. OD, ⅜ to 1⅝ in. long

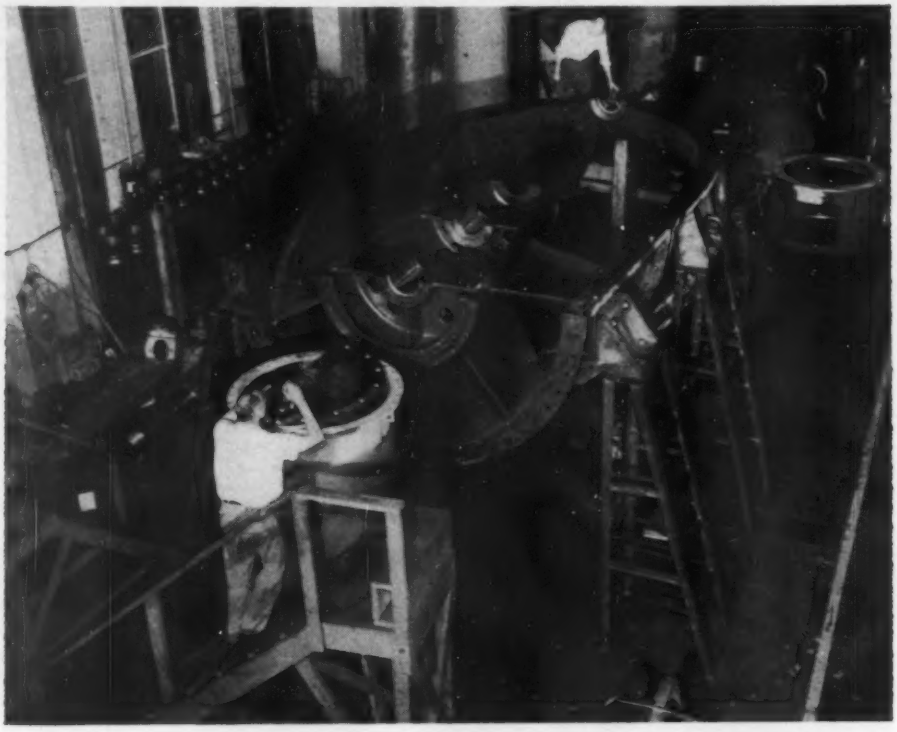


When stator cores are turned, air gaging for automatic control of compensation for tool wear has been accomplished satisfactorily by comparing OD size of finish-turned piece with fixed OD of precisely finished, hardened surface on work-driver extension (above). Spindle must be stopped and part removal delayed during gaging, slowing cycle

Tool drums used in both types of self-resetting lathes are set to size in the toolroom, using carbide-tipped bits with ½-in.-sq shanks. Air gage is used as comparator, being set to size with accurate master drum (right). Toolbit cutting edges are set within 0.0002 in. of radial position to insure accurate positioning of each pair of cutting edges when drum is indexed in lathe



Success of the self-resetting automatic lathe lies in design of special front slide which acts under control of air gage, and indexable positive stops and tool drums, to move toolbits forward (or replace them with sharp bits) to compensate for wear on cutting edges. While all adjustments and cycle-sequence steps are controlled by limit switches and solenoid valves, they are accomplished mechanically with devices whose long service life individually has been proven by years of use in machine tools and other mechanisms. Precision wedge adjustment of front slide permits setting new tool drum to gage block for first cut, simplifying setup



Three 10-in. bearing bores . . .

. . . spaced 4 and 12 ft apart, in this lower case for a 116-in. horizontal propeller-type pump must be in line within 0.003 in. both vertically and horizontally. Checking hours were cut to minutes when telescope was substituted for taut-wire method. Pump for which this part was made is driven by a 1600-hp F-M diesel, pumps 23,400,000 gph of water to drain a swamp

Telescope cuts inspection

Large diesel and pump bores, machine-tool ways, and big surface plate checked with alignment unit instead of conventional taut wire

Major time savings in checking alignment of bearing bores in large parts have been realized with a precision alignment telescope and illuminated targets in place of the more conventional taut wire strung along the axis. Most frequent use of the telescope is for checking the alignment of crankshaft and camshaft bearing bores in 6- to 12-cyl blocks for large diesel engines.

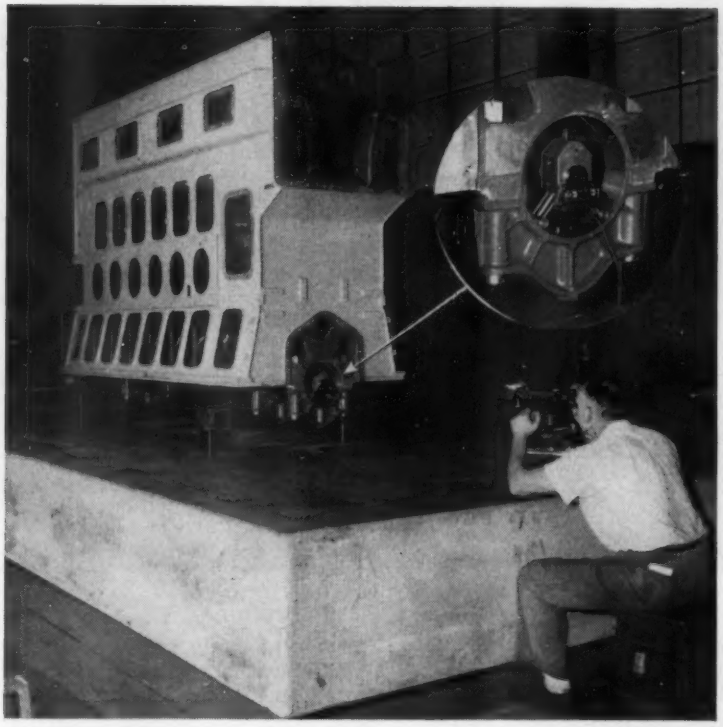
More spectacular savings, however, are accomplished in the inspection of bearing alignment in casings for large centrifugal and propeller-type pumps, like the six 116-in. horizontal units completed last year for the Corps of Engineers, and the huge 144-in. pump now under construction.

In addition, the telescope has checked the alignment of top surfaces of large surface plates, and alignment of ways on large machine tools. In one case, it was used to determine the distortion of the frame for a diesel-electric railroad locomotive after assembly of prime mover and generator.

For these operations, the instrument used is a 32X magnification Leitz alignment telescope focusable with rack-and-pinion adjustment between 40 in. and 164 ft. The instrument has a micrometer attachment reading to 0.001 in. for measurements in vertical and horizontal planes. Refocusing to sight on targets placed at various distances from the observer does not impair working accuracy.

In use, the crosshairs in the eyepiece of the telescope are centered on the star pattern of the reticle of an illuminated target, and vertical and horizontal readings are taken from the micrometer drums. For checking alignment of bearing bores, we have developed several target holders (photo and sketch) which can be adjusted for bore diameter and support the cylindrical target. Illumination behind the target reticle can be adjusted with a rheostat on the power supply.

When position readings have been taken from such illuminated targets placed alternately in the several bearing bores, it is a simple matter to plot the readings and read from the chart the alignment relationship of several bores, or of several points along machine ways or over a plane surface.

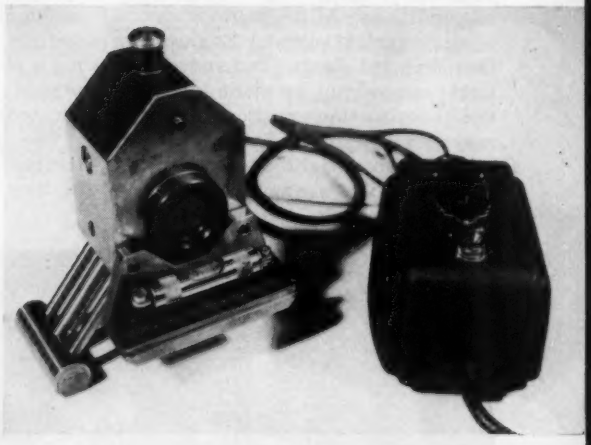


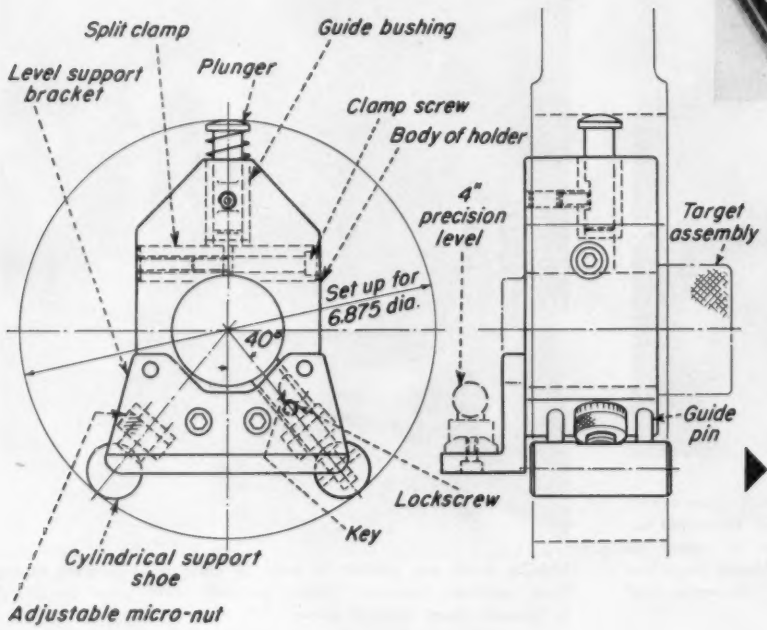
Cylinder blocks . . .

. . . for F-M opposed-piston diesels are set up on 8x18-ft granite block for checking alignment of crankshaft and camshaft bearing bores. For best results, closest target position should be at least 5½ ft from telescope. This granite surface plate, one of largest in Metalworking is accurate to 0.005 in.

time

JOHN SEDORIC, manager of Quality Control,
BELOIT WORKS, FAIRBANKS, MORSE & COMPANY





Designed by Fairbanks-Morse Engineers . . .

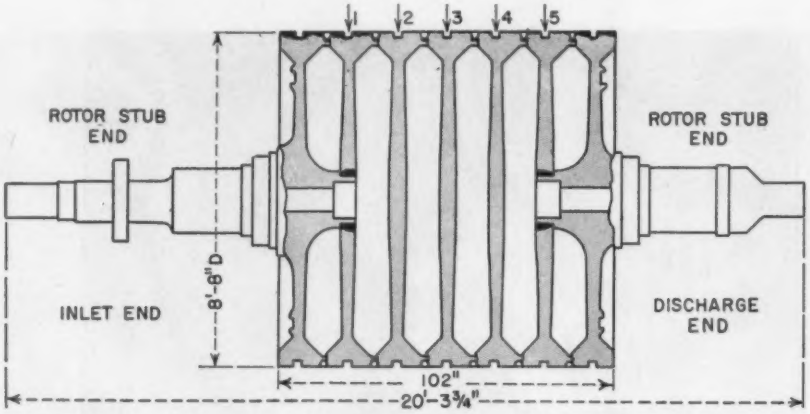
. . . for bore-alignment inspections, this target holder can be fitted with legs of different lengths for bores from approx 6½ to 10 in. dia. A 4-in. precision level helps center unit in bore of bearing

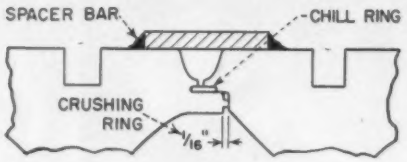
Usable both for checking alignment . . .

. . . of bearing bores, and for checking plane surfaces, like surface plates annd machine ways, target assembly centers reticle cartridge between two support legs. Legs can be adjustable (above) or interchangeable (photo) as desired

Unusual welding techniques build compressor rotor

When you have to assemble 7-ft disks by circumferential welds, and maintain alignment and concentricity to close limits, ordinary methods won't work . . . Here's how it was done





AXIAL-FLOW COMPRESSOR is built up of two end disks and five center disks. Chill ring guides assembly of first disk to stub end, and spacer bars maintain alignment

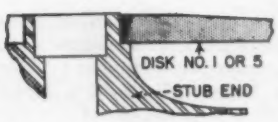
R E O'BRIEN,
ALLIS-CHALMERS MFG CO

Size and required performance of a 1 million cfm, axial-flow air compressor built by Allis-Chalmers for a wind tunnel at Arnold Engineering Development Center demanded that novel approaches be made in design and construction, particularly with respect to the rotor. This unit is relatively light-weight and consists of five solid disks sandwiched between two disks to which are forged the stub ends of the rotor shaft. Blades are set parallel in circumferential grooves on the rotor's outer surface.

Forging and machining of the fabricated rotor presented no special problem. The test of engineering ingenuity lay in designing and executing a procedure for welding it so the utmost in accuracy, alignment and concentricity would be realized.

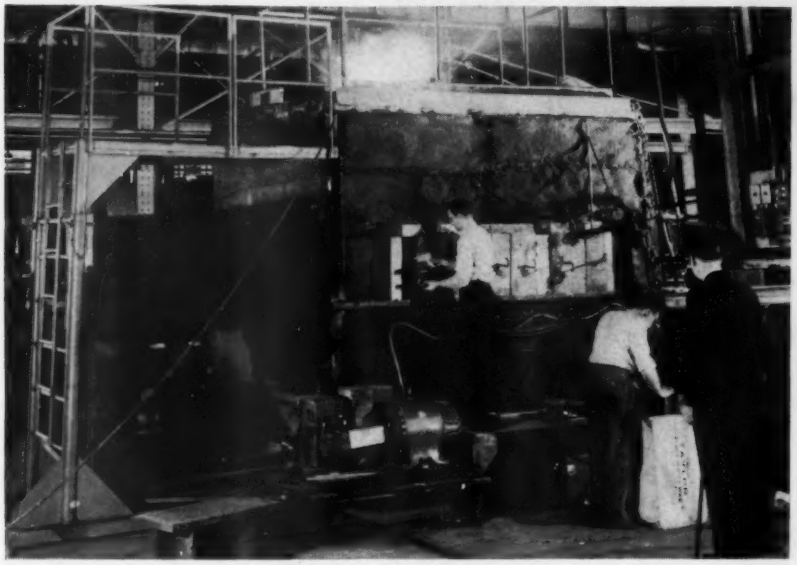
The rough-machined and heat-treated carbon-moly forgings were further machined to allow for the insertion of strain gages. A circumferential groove was cut in each disk and end piece to aid in maintaining correct alignment and dimension during assembly and welding.

Actual assembly began with fitting a chill ring of 1020 steel to the inside face of the rotor inlet end piece. Disk No. 1 was heated to about 300 F before being joined to the inlet end by the chill ring. To maintain alignment and concentricity during further assembly, 12 spacer bars, 2 x 6 in. each, were welded to lap the disk and stub



INLET STUB END HUB is welded to center of No. 1 disk. Preheated assembly is kept hot by heavy insulating blankets. Similar procedure was followed for discharge end and disk No. 5

SPACER BARS are welded to disks to maintain alignment during final welding. Operator (right) preheats weld area to 200 F to prevent local thermal stress



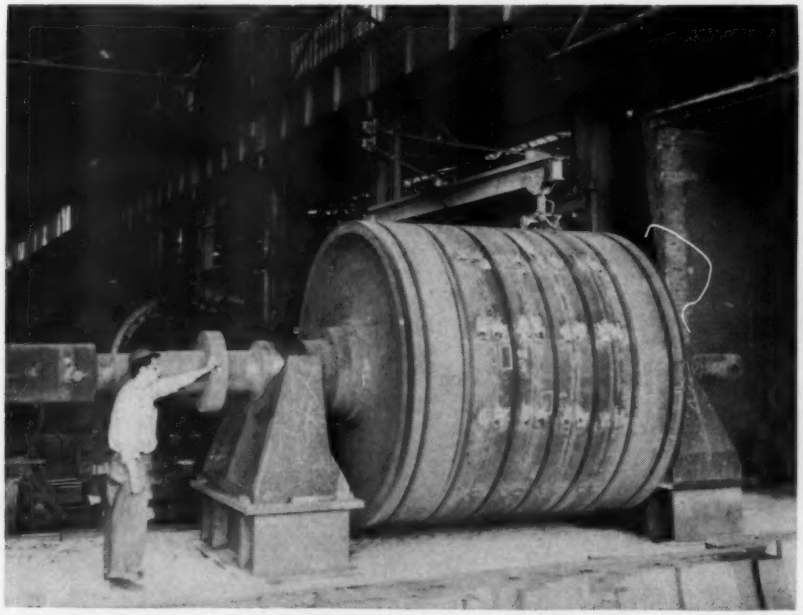
SPECIAL HEATING UNIT maintains rotor assembly at a temperature between 350 and 500 F during final welding operations

end. The area about each spacer bar was heated to 200 F prior to welding to prevent local thermal stresses.

Next, the inlet end assembly was heated to 650 F at the rate of 50° per hr in a specially constructed heating chamber, and held at heat for 12 hr before welding.

With two welders working simultaneously on the vertically mounted assembly, the stub was welded to the center of disk No. 1. One 3/16-in. bead was laid against each side, and a third was laid over the two. This first layer was thoroughly peened and Magnafluxed for possible flaws. Successive layers consisted of at least two beads. Full-width weaving was not permitted and each layer was carefully inspected.

During welding, the piece was enclosed by a well-insulated housing which kept it between 350 and 500 F. Each assembly was stress-relieved at 1050 F after welding. This included furnace cooling of the assembly after it had been heated at 1050 F for twelve hr.



MOUNTED IN V-BLOCKS, the completed rotor weldment is rotated during the stress-relieving heat treatment

The discharge end and disk No. 5 were similarly assembled, welded, and heat treated.

Next followed "stacking" of the rotor elements. With its axis in a vertical position, the discharge end and disk No. 5 were mounted on the assembly rig. Disk No. 4 was located by its chill ring and firmly strapped with spacer bars. Disks 2 and 3 were similarly erected in place. After the assembly was "capped" with the inlet-end elements, the rotor was swung to a horizontal position.

In the final welding, the first layer of each circumferential weld was laid with 3/16-in. electrodes and the weld was built up with ¼-in. beads. Spacer bars were cut off after the third layer had been laid, and the disks were drawn together, crushing the 1/16-in. crushing ring. Weaving was permitted to a width of ¾-in., and beyond that a split-weaving technique was used. Frequent Magnafluxing was used to detect possible flaws.

Rather than complete each circumferential weld before beginning the next, and thereby risk setting up dangerous thermal stresses, a progressive sequence was used. The joint between the inlet end and No. 1 disk was welded 60% complete, then that between 1 and 2 was welded 60%. This procedure was followed to the joint between the No. 5 disk and the discharge end. With this joint completely welded, the welders worked back to the inlet end, finishing all joints.

During final welding, the rotor temperature was maintained between 350 and 500 F. After the rotor had been completely welded, it was stress relieved in an annealing furnace, during which it was kept revolving. The welds were rough machined and Magnafluxed before final machining.

The last step in the construction of the rotor was the insertion of the blades in their grooves. With a final check on its balance, the rotor was complete, ready to be fitted into the stator.

Quicker drawings mean Quicker parts

Simplified drawings were adopted to save time of draftsmen, but some unexpected benefits showed up in the toolroom, leading to faster understanding of parts and setup of equipment

W K HODSON, vice president,
METHODS ENGINEERING COUNCIL, PITTSBURGH 21

Valuable unexpected savings resulted from the introduction of "simplified drafting" of tool designs at Steel City Electric Co, Pittsburgh. Savings showed up in the toolroom, where operators could greatly shorten the time needed for study of blueprints to visualize the part, decide how it should be made, and compute dimensions needed for setup and machining.

"Chain reaction" benefits started when time standards were being set up in the toolroom, preparatory to installation of a wage-incentive plan. "Study time" was too widely variable for consistent standards, because work drawings and instructions differed too much from print to print. In many cases, parts were made from verbal instructions and rough sketches, with no permanent record.

To correct this problem, attention shifted to the drafting room, where it was found that the existing staff couldn't handle the extra load if all part prints were to be made correctly in the conventional manner. Rather than increase the staff, it was decided to use simplified drafting, to save drawing time by eliminating unnecessary details from drawings and putting needed information in the easiest form to use.

When these simplified drawings began to flow into the toolroom, it was found that savings were not limited to the cost of drafting. Toolroom operators stepped up incentive output by lowering the time needed to read prints and set up machines. Also, the common practice of making "hip-pocket" notes and calculations practically stopped, because dimensions needed for machining were already incorporated in the print. Particularly helpful to jig-borer operators, for example, is the use of coordinates to locate all holes from a given reference corner of the part.

Other byproduct benefits have resulted from the method change, such as comparative freedom from requests to clarify drawings, increased operator confidence, and reduction of rework. Also, when instruction sessions were held to familiarize shop and drafting personnel with the changes, the shop men and draftsmen were able to cooperate in improving tolerance specifications and choice of cutting-tool sizes.

Two versions of same part,

for which time studies were taken to compare the time required to examine the print and prepare for machining the 46 holes on a jig borer. Results of the studies are shown on the facing page. On standard drawing, some dimensions had to be found that had no relation to the hole in question, and simplified drawing eliminated transposing 136 dimensions to a scratch pad and making 65 additions or subtractions

Summary of time-study results:

ELEMENT DESCRIPTION	TIME PER HOLE (Average)	
	Standard	Simplified
Search for dimensions	0.00494	0.000628
Record dimensions for adding and/or subtracting	0.00672	Not required
Add and/or subtract	0.00672	Not required
Check addition and/or subtraction	0.00211	Not required
TOTAL PER HOLE:	0.01737 hr	0.000628 hr

GENERAL INSTRUCTIONS

1 . . Read drawings thoroughly *before* starting work. The detail drawings may not always show all radii or relief angles. Therefore it is necessary to read all notes and dimensions before work is started.

2 . . *Do not scale drawings.* Work to dimensions only.

3 . . When any changes are necessary, fill out die-shop change notice.

4 . . The pieces will be detailed with the top of the section shown as the face of the drawing. EXAMPLE: For punch holders, the surface which is against the die shoe is top, and will be shown in that way.

5 . . Tabulated drawings may be used frequently. Be sure to read the drawing thoroughly to relate all dimensions to their proper piece. Drawings cannot be read at a glance—time must be spent to thoroughly understand them.

6 . . Tap-drill sizes will *not* be shown on drawing. Tap size and depth *will* be shown in note form and tap-drill size will be chosen by man making the piece.

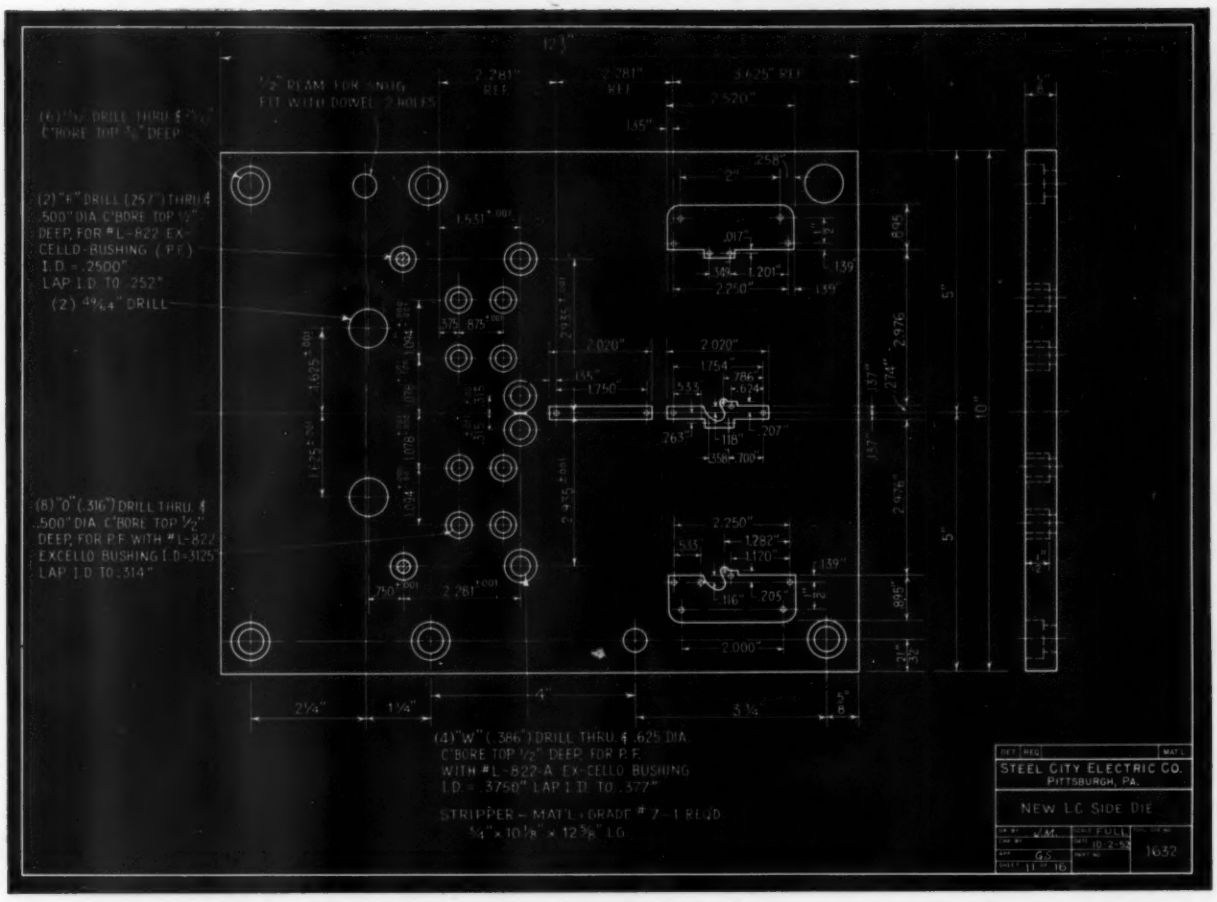
7 . . Dimensions shown on drawings must be adhered to at all times. Dimensions should not be changed indiscriminately. This will help in making repair parts and also reduce the time needed by the draftsmen to make changes.

8 . . Do as little "hand fitting" as possible. Work to tolerances. There will be a standard tolerance block placed on all detail drawings, which will apply *only* when there is no other tolerance specified on the drawing.

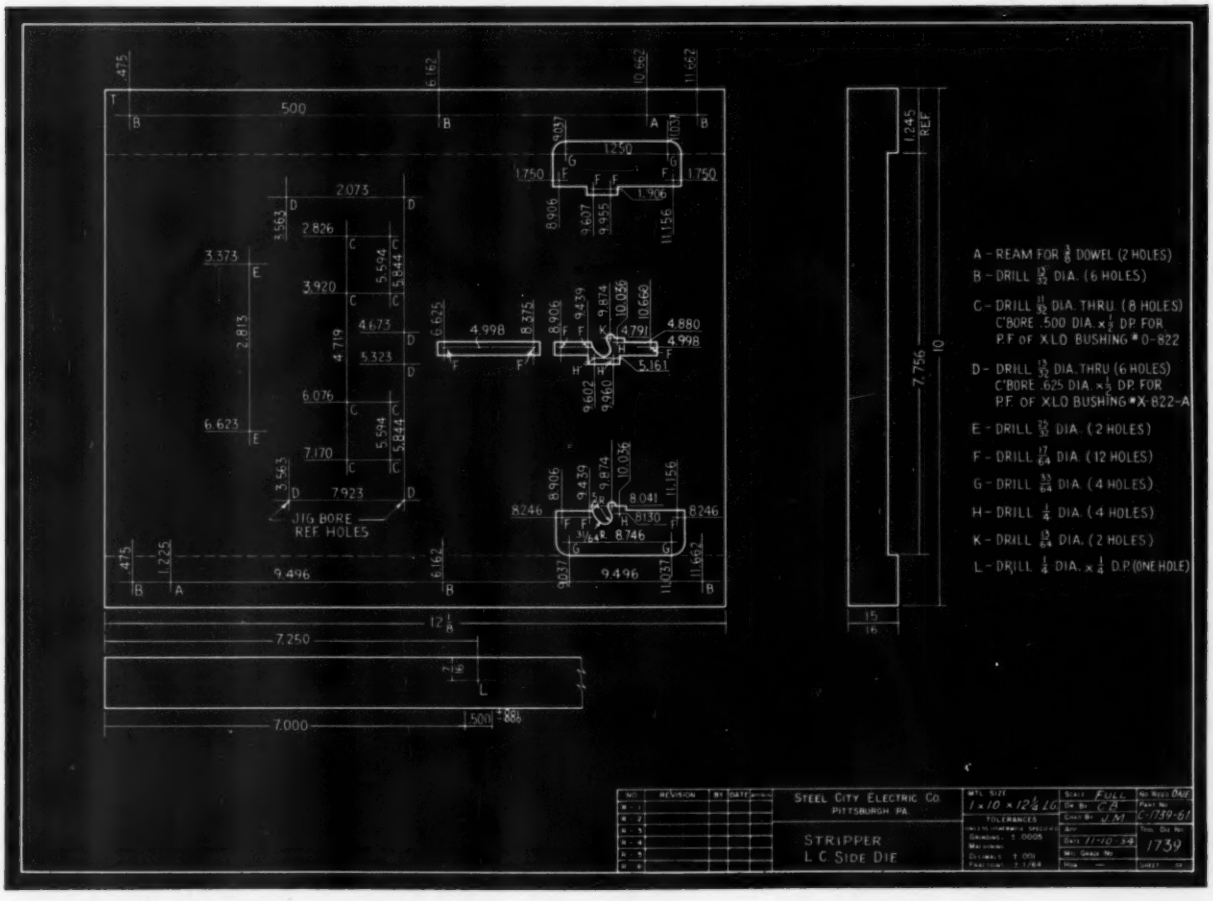
9 . . The draftsmen will, where at all possible, show the part in the same position as it will be placed in the various machines.

10 . . The draftsmen will also try to eliminate all confusing and unnecessary lines and dimensions, so that machine operators and assemblymen will not have to choose which dimensions apply to the job they are doing.

▼ CONVENTIONAL


12¾"
½" REAM FOR DOWEL 2 HOLES
2.281" REF
2.281" REF
3.625" REF
2.520"
1.45"
(6) 13/32" DRILL THRU & C'BORE TOP 3/4" DEEP
(2) "F" DRILL (.257") THRU & .500" DIA C'BORE TOP ½" DEEP FOR #L-822 EX-CELLO-BUSHING (P.F.) I.D. = .2500" LAP I.D. TO .252"
(2) 49/64" DRILL
(8) "O" (.316") DRILL THRU & .500" DIA C'BORE TOP ½" DEEP, FOR P.F. WITH #L-822 EXCELLO BUSHING I.D.=.3125" LAP I.D. TO .314"
(4) "W" (.386") DRILL THRU & .625 DIA C'BORE TOP ½" DEEP FOR P.F. WITH #L-822-A EX-CELLO BUSHING I.D. = .3750" LAP I.D. TO .377"
STRIPPER – MAT'L - GRADE # 7 – 1 REQ'D
¾" × 10⅛" × 12⅝" LG
2.250"
2.020"
1.754"
1.750"
2.000"
2¼"
1¼"
4"
3¾"
STEEL CITY ELECTRIC CO.
PITTSBURGH, PA.
NEW L.C. SIDE DIE
1632

▼ SIMPLIFIED



Initial welding line...
for M59 hulls. Upper hull is assembled in fixtures in right foreground and tack welded after temporary bulkheads are installed. Then hull is swung in trunnions and welded (left foreground). Lower hulls are checked and fitted to inverted upper hull with locating dogs on the fixture (three at left center). Basic hull welding is completed on turnover fixtures in background

Design for production... and

The Armored Infantry Vehicles the Army is buying today give better performance than the previous design, yet cost less than half as much. Reason for the saving: Food Machinery's Ordnance Div, in cooperation with the Army Ordnance Corps, designed it, based on experience with the forerunner, to be economically produced

ANDERSON ASHBURN, special projects editor

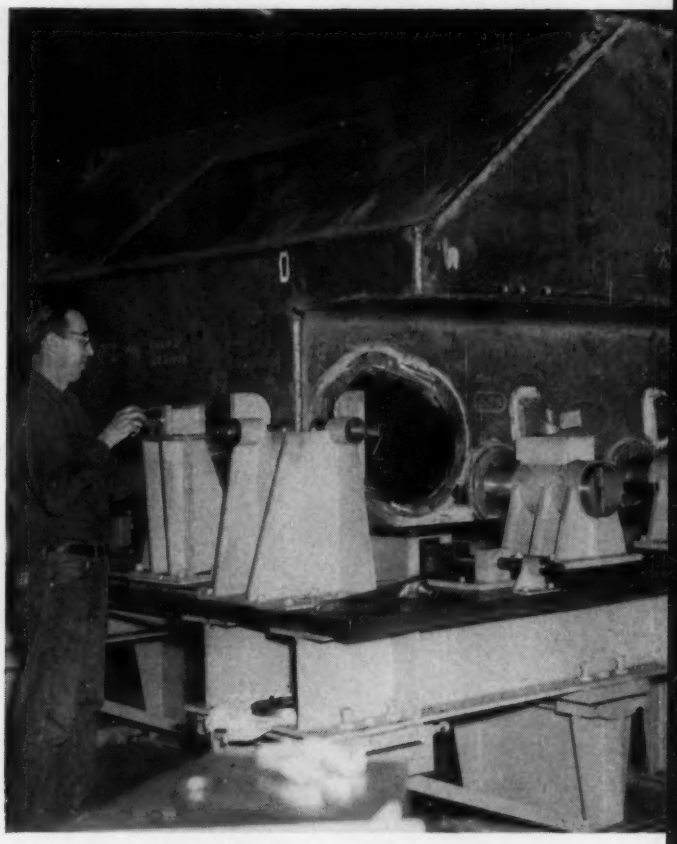
While building the M75 armored infantry vehicle, the Ordnance Div of Food Machinery and Chemical Corp, San Jose, Calif, thought the vehicle could be improved both in performance and in producibility. Their proposals met a warm reception in the Army Ordnance Corps and the result was the current M59, for which FMC's Ordnance Div is the only prime contractor.

The new carrier, which looks much like the old one, costs less than half as much as its predecessor and has demonstrated vividly the advantage of designing with a basis of production experience.

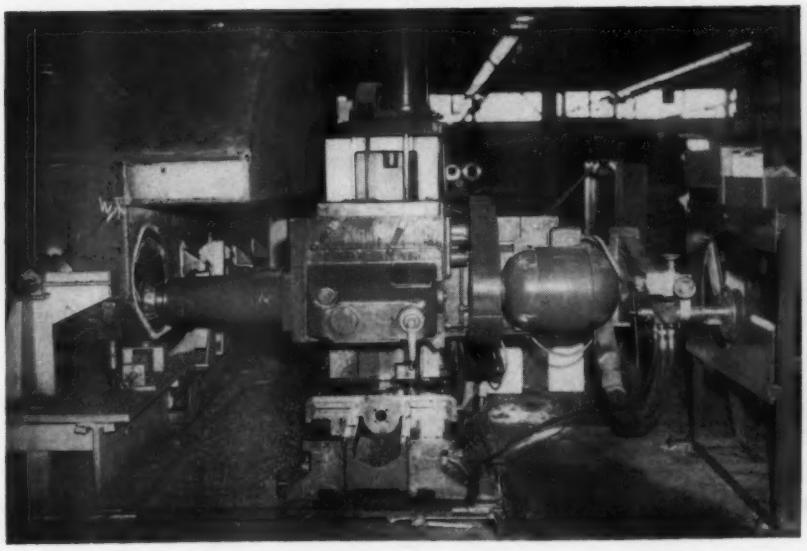
Key steps in the production of this "new-look" military vehicle are pictured on these pages.

Bulkheads . . .
are temporarily installed into lower hull sections. They serve to gage and hold spacing of side plates against distortion during welding. All hull welding is performed by hand in the downhand position with stainless rod. Hull is assembled entirely from flat armor plate and is designed for minimum number of individual pieces and welds

halve the cost

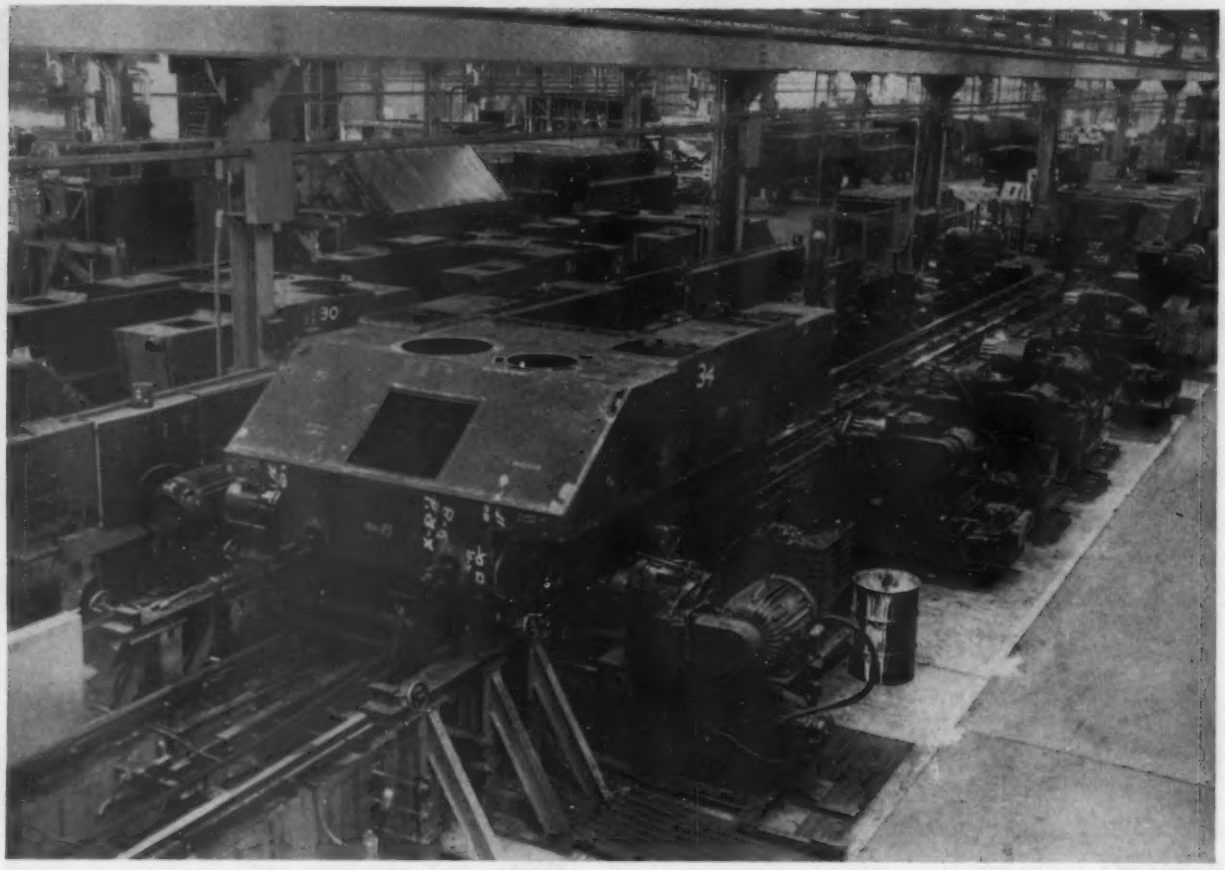


Master hull checking and locating fixture . . .
is key to accurate and economical machining of hull. Corner jacks and wedges position the hull manually while the large stepped plug gages along the side check the ten bogie-arm mounting surfaces. Hull is positioned so there is sufficient stock for finish machining the rings. Then four locating rings fitted over locating pins mounted on the checking fixture are attached to the hull. The two rings at the forward end (operator is positioning one) are tack-welded into position. The two at the rear are in such position that they can be clamped to hull. From this point, the hull is positioned for all machining operations by pins on the fixtures that fit these locating rings



Milling the "horsecollar" . . .
on which final drive is mounted. Special Forney milling machine is controlled by hydraulic tracer following templet at right. The 15,000-lb hull is located in relation to machine by four inclined plane jacks and eight screw jacks so that locating pins (one can be seen at left) slide into locating rings. A second Forney mill on the other side of the fixture mills the other final-drive mounting in the same setup

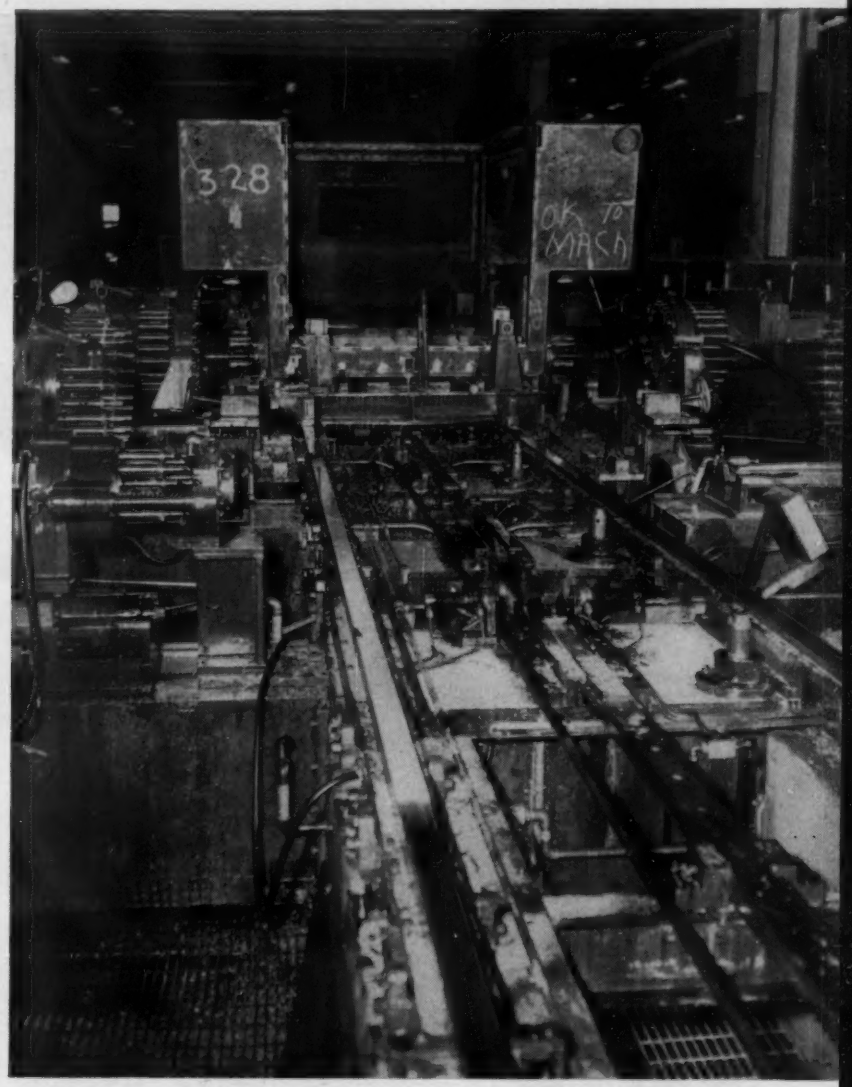
PLEASE TURN PAGE . . .



Machined hull ... is returned to welding shop where it travels down this line for addition of fixtures and brackets in locations that would interfere with machining if added earlier, or in positions that must be located from machined surfaces

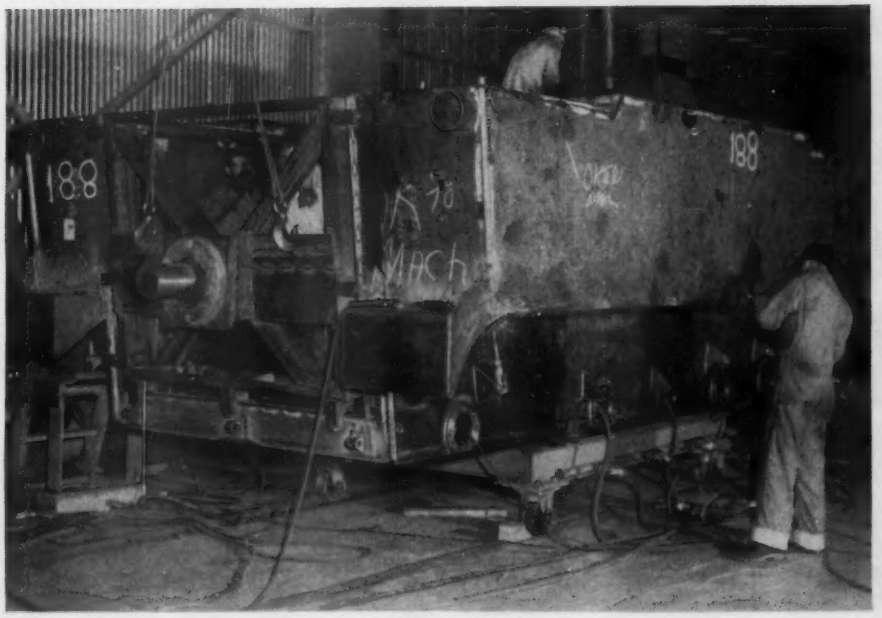
Hull is positioned . . .

on carriage of transfer machine by locating pins, then carriage moves along rails to progressive stations. First pair of units bore, chamfer, and face each of the bogie mountings in turn, next pair drills 7 holes at each bore, third pair drills 16 holes in horsecollar on each side, fourth pair taps the horsecollars, and fifth pair taps the bogie-mounting surfaces. Built by Baker Brothers, the transfer machine has 12 units ranging from 10 to 40 hp each. Stanchions and handwheels in foreground clamp hull to damp vibration during milling operation at first station



Transfer carriage travels on rails . . .

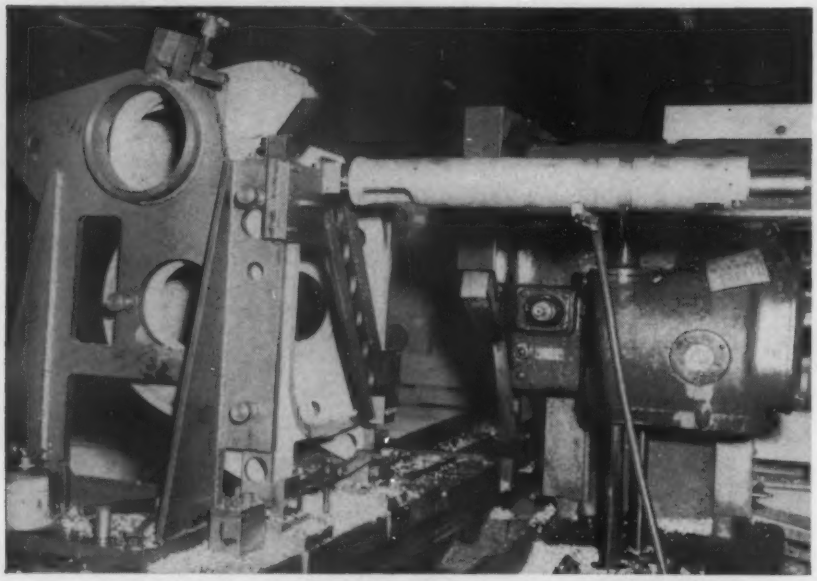
(one V-way and one flat) mounted on concrete base of machine. Locating rings at rear of hull can be seen in this view. Plugs can be removed from rings once hull is located because 7½-ton hull is clamped to prevent shifting once it has been positioned on carriage. Large vertical pins locate carriage at each station and interlocks prevent the operation of units at each station until the pin is seated in carriage. Pairs of small horizontal cylinders push a pin attached to the carriage into or out of one of several eyes mounted on top of the center transfer bar. When the pin is in one of the eyes, the carriage and hull are moved with the transfer bar to advance hull to next station



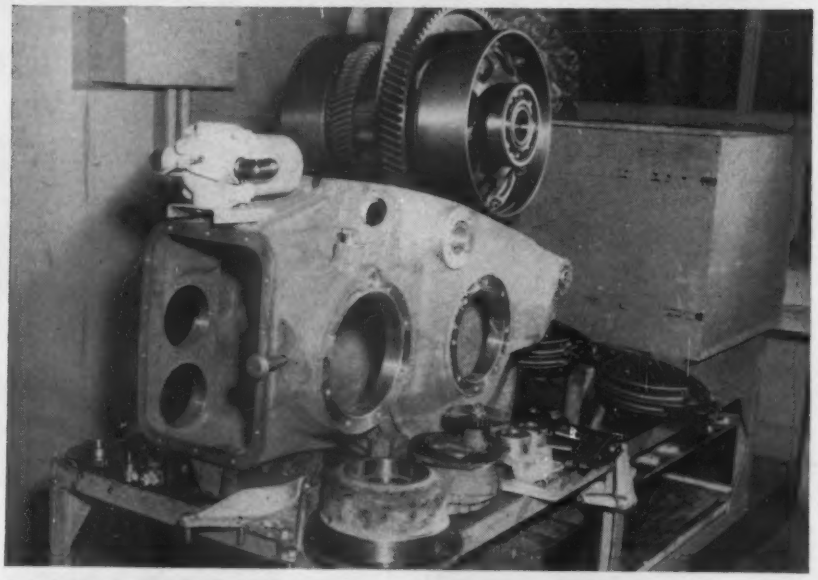
Final welding . . .

of hull after machining is limited to work that will not warp floor. Thus torsion-bar brackets with oversize holes are welded to floor before machining. Then, at this stage, machined blocks with precision holes are positioned and welded to brackets. Hull is then ready for steam clean, phosphate coating, prime and finish painting, and final assembly

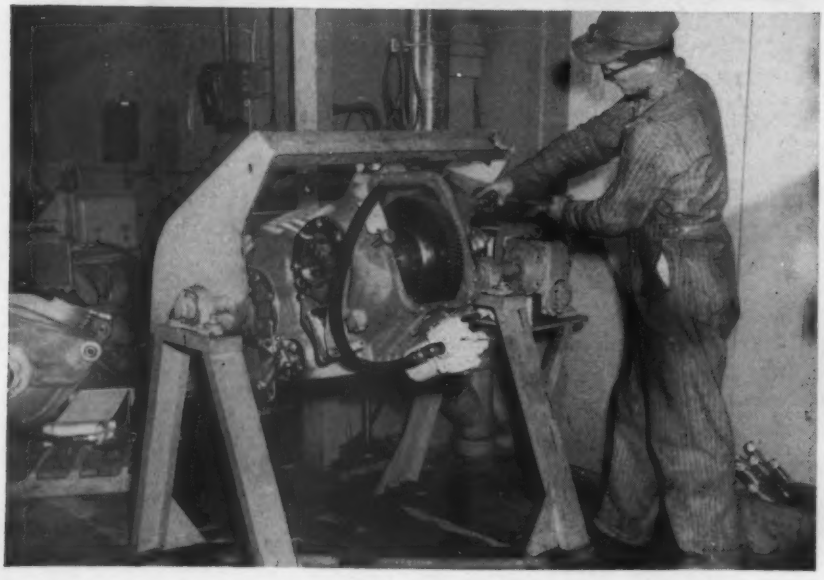
PLEASE TURN PAGE . . .



Master fixture . . .
for controlled differential gear case uses same procedure as for hull. After case has been mounted in fixture and located so there is sufficient stock for boring of cored holes, Keller airdrills are used to drill and ream two dowel locating holes in the milled cover face. All subsequent machining operations are located from these holes



All parts required . . .
for assembly of controlled differential are collected on cart and moved by assembly line. Here, at first station in line, gear subassembly is lowered into case. Line is short, only four stations, but breaking assembly into stages simplifies training and speeds production



Assembled differential . . .
is mounted in rollover fixture and rotated to check for loose parts. Hose connections, radiator, and covers are assembled and the unit is run in. Covers are then removed and tooth bearing is checked and adjusted, if necessary. The completed differential requires minimum connections when installed in the hull

American Machinist

SPECIAL REPORT NUMBER 387

HOW TO SET UP A Gaging policy and procedure...

D G MECKLEY III, manager, Quality Control and Inspection, YORK CORPORATION, YORK, PA.

To achieve true quality control, there must be common denominators for the diverse needs and aims of your own engineering, production, inspection, industrial engineering and purchasing departments, plus those of your vendors. One denominator, in our case, is a gaging policy and procedure that has six components, or areas of influence. By three years of cooperative effort among the departments concerned, we have developed a control system that gives us a running inventory of all gages, tools, dies and templets, and provides for their periodic inspection and repair to known standards. We have set up a centralized gage laboratory, plus strategically located substations to check these "instruments of production." We have adopted uniform gaging practices. All this has led to a far more correct "picture" of the quality of our products on an hour-to-hour basis, and has materially assisted in establishing a better relationship with our vendors.

COPYRIGHT 1955 BY McGRAW-HILL PUBLISHING CO, INC 330 W 42 ST N Y 36, N Y

THE PROBLEM:

low-cost control of gages and tools

From the smallest machine shop to the largest assembly plant, the problem of economically controlling and utilizing gages, tools, dies, and templets* is one of the most complex production operations. Yet this problem has received little attention as an integrated corporate function. Toolrooms often operate as a self-contained unit. Gage inspection operates in another area. The engineers do not understand what production-gage facilities are in use. Engineering, industrial engineering, inspection and purchasing departments frequently fail to inform each other about their "instrument" problems, because no well defined procedure is available.

Specifically, these are the reasons why instrument control is important:

1 . . In our case, the value of hour-by-hour judging of the quality level of York Corporation products, from the receipt of raw materials through final testing, is dependent on the accuracy of 12,000 measuring instruments and tools in daily use.

2 . . The failure of these instruments to supply needed information, to portray the correct picture, causes "good" material to be unnecessarily scrapped or reworked, and "bad" material to be shipped as "good."

3 . . Failure of instruments can cause, and has caused, serious production delays.

Note: If the instruments are not rigidly controlled and the instrument inventory effectively utilized, the existing instrument inventory is likely to skyrocket beyond needs or reason.

4 . . The industrial engineering department depends on accurate gage records as the basis for what new instruments are required for projects.

5 . . Lack of common techniques and terminology among development engineers, industrial engineers, and quality control and production supervision can develop serious production conflicts. For example, the developer may use a dial bore gage for his calculation and then dimension the drawing from data developed from his gage reading. The production shop may set up an air gage and work from the developer's drawing. When samples are made the engineer will find they are not valid, because the different measuring techniques produce very slight, but measurable, differences in reading dimensions.

6 . . York uses parts from a large number of suppliers. Without a common understanding of instrument techniques and gage tolerances, the suppliers may ship pieces that they are certain are acceptable, only to find that they are rejected when received at York.

7 . . In cases where York products are rejected by customer or contractor, it is imperative that calibration of York and customer instruments be on a common basis.

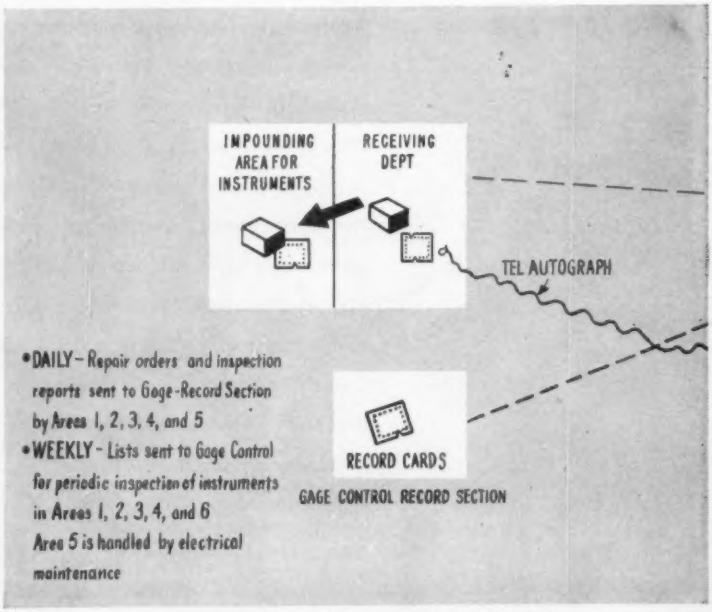
8 . . With diverse compressors, air-conditioning units, and ice-making equipment undergoing yearly model changes, the proper reuse of instruments on subsequent models is an important economic consideration. Also, the availability of a catalog of common types of tooling for new but similar applications is important.

9 . . Without an integrated approach among engineering, industrial engineering, quality control, and purchasing departments, unnecessary and costly tolerances are created.

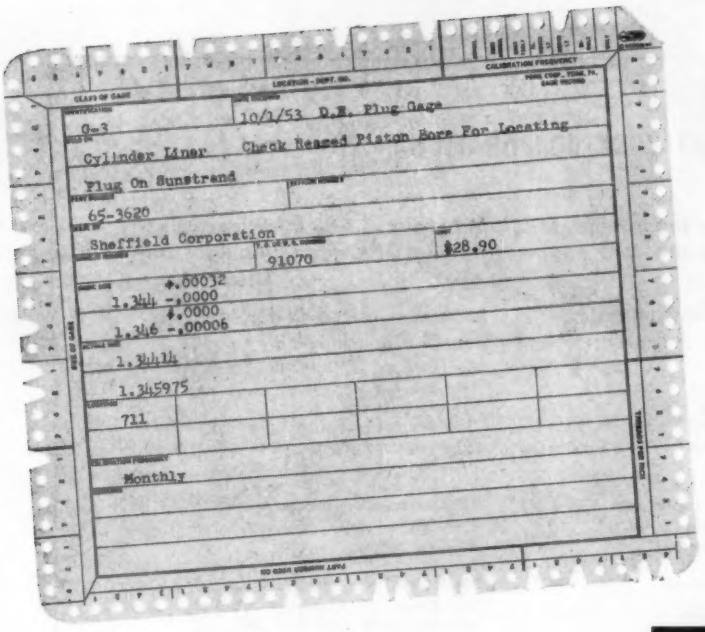
10 . . Product tolerances in the magnitude of 0.0001 in. make gaging accuracy a large factor in product acceptability.

11 . . With an expanding physical plant, it is important to utilize the latest developments in instruments.

* From this point on, all of these categories will be referred to by the general designation, "instruments," unless an individual category is discussed.


IMPOUNDING AREA FOR INSTRUMENTS
RECEIVING DEPT
TEL AUTOGRAPH
•DAILY – Repair orders and inspection reports sent to Gage-Record Section by Areas 1, 2, 3, 4, and 5
•WEEKLY – Lists sent to Gage Control for periodic inspection of instruments in Areas 1, 2, 3, 4, and 6
Area 5 is handled by electrical maintenance
RECORD CARDS
GAGE CONTROL RECORD SECTION

CONTROL PROCEDURE . .
Diagrammed is the procedure and paperwork that controls the inspection, use and calibration of instruments



RECORD CARD . .
Details of 12,000 gages, measuring instruments, tools, dies and templets are recorded on McBee cards. These cards are punched for sorting by class, location, calibration or inspection frequency, and part number of piece. By sorting, all cards for the instruments used in manufacture of a particular part can be picked out, or, again, the gages to be inspected at a given time. This one card gives complete information on the instrument involved; source, cost, initial inspection, repairs and date of obsolescence

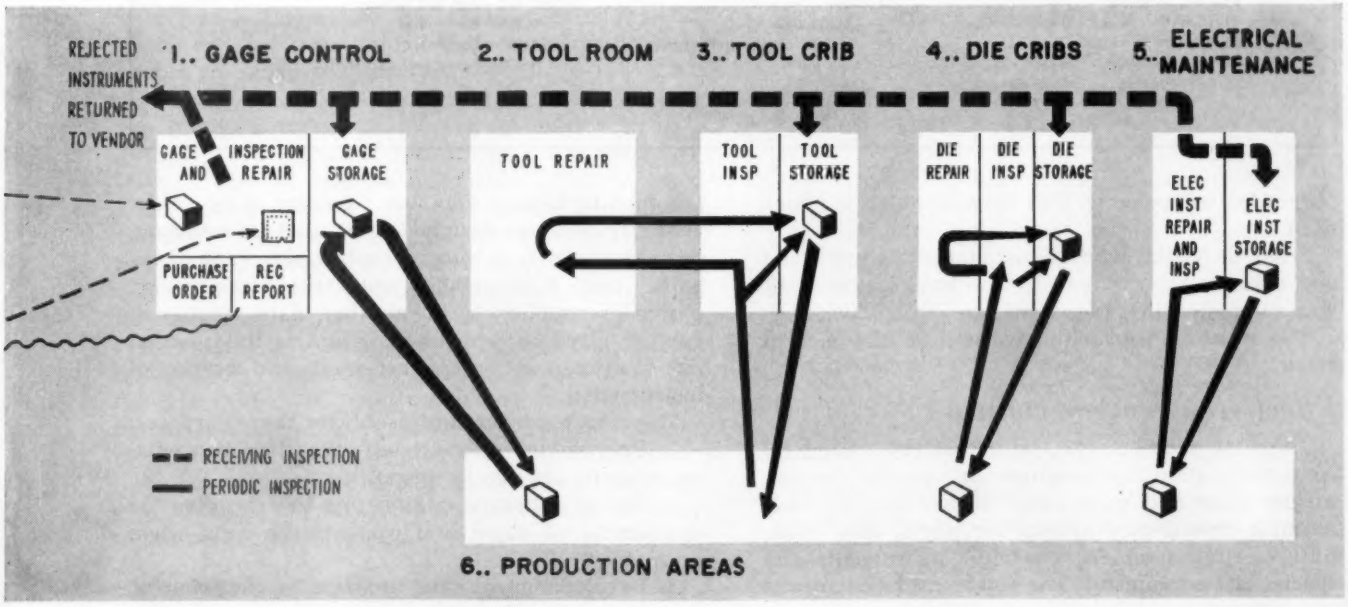
CONTROL CENTER . .
Only one person, the record clerk, is authorized to transcribe information on McBee cards and to sort them. Here, he is getting the information on gages that require periodic inspection

How we approached the problem

With these considerations in mind, a development program was started to devise organized systems and procedures and to integrate them into an instrument control plan. The initial effort started with loosely federated groups. Within a year, six components of the program were recognized as being important:

1 . . An effective inventory control system for gaging instruments
2 . . Periodic inspection and calibration procedures
3 . . Standardized calibration methods
4 . . Adequate instrument laboratories
5 . . Uniform gaging practices
6 . . Standards for instrument design and purchase

In addition, the importance of tolerance establishment and interpretation on both manufactured and



CLASSIFICATION OF "INSTRUMENTS" AT YORK CORPORATION

(Gages, electrical equipment and tools are separated into related groups. Any additional classifications would be established jointly by the tool engineering and the gage and tool departments)

1 . . #1 through #299—for gage and tool control utilization. **2** . . #400 through #699—for tool engineering utilization. **3** . . Classes of tools, gages and electrical equipment are as follows:

10—Cylindrical gages
11—Master discs
12—Master rings
13—Tapered plug gage
14—Double end plug gage
15—Single end plug gage
16—Progressive plug gage
17—Flat plug gage
18—Air plug (See class 110)
19—Comptor plug gages (See class 60)
20—Thread gages
21—Plugs
22—Rings
23—Snaps
24—Set plugs
25—Pipe plugs
26—Pipe ring
27—Pipe master plug
28—Pipe master ring
29—Screw pitch
30—Snap gages
31—Dial
32—Adjustable
33—Thread (See class 20)
34—Air (See class 110)
40—Micrometers
41—Outside
42—Inside
43—Depth
44—Supermicrometer
50—Vernier Gages
51—Height
52—Caliper
60—Dial Indicators
61—Indicators
62—Comptor
63—Dial bore
64—Speed Indicators
70—Pressure gages
80—Fixed size gages
81—End measures
82—Length
83—Radius
84—Gage blocks
85—Feeler gages
86—Snap gages fixed
87—Thread wires
90—Fixture gages
91—Dial type
92—Functional
93—Air fixtures (See class 110)
100—Sound level
101—Decibel meter
110—Air gages
111—Base instrument
112—Air plugs
113—Air snaps
114—Special air fixtures
120—Comparators
121—Dial
122—Visual
123—Optical
124—Comparator
130—Surface finish
131—Profilometer
132—Comparison samples
140—Hardness test equipment
141—Rockwell
142—Sclerescope
143—Brinell
150—Electronic
151—Voltmeters
152—Wattmeters
153—Bridges
154—Powerstats
155—Klixon tester
156—Oscilloscope
157—Elec-Detec
158—Inspectroscope
160—Temperature control
161—Recorders
162—Thermometers
170—Squares
171—Cylindrical
172—Solid
173—Combination
180—Angular check equipment
181—Sine plate
182—Sine bar
183—Protractor
190—Internal measuring equipment
191—Telescope gages
192—Ball gages
193—Dial bore
200—Surface plate and accessories
201—Surface plate
202—Vee blocks
203—Parallels
204—Height gage (See class 50)
205—Knees
206—Sine plate (See class 180)
207—(All items in class 180)
210—Timers
211—Stopwatches
220—Pressure gage tester
221—600 lb. capacity
222—7000 lb. capacity
230—Optical flat
231—Monochomatic light
232—Flats
240—Moisture control equipment
241—Aminco Weaver
242—Almor Dewpointer
250—Magnifying equipment
251—Microscope
252—Illuminated magnifying glass
260—Leak detector
261—G.E. leak detector
262—Halide torch
263—Helium
270—Torque wrenches
280—Flometers
400-409—Cutters
410-419—Drills
420-429—Tool bits
430-439—Reamers
440-449—Taps
450-459—Jigs and fixtures
460-469—Jigs and fixtures
470-479—Punch dies
480-489—Templates
490-499—Power tool accessories

purchased components was recognized as a major need.

From this point, specific assignments were made and periodic reports issued. The bulk of the work was completed in three years.

The areas enumerated above will be discussed in order:

Effective inventory control

The first decision was the agreement among all concerned—industrial engineering, quality control, maintenance and purchasing departments—to use a single record-card system for gages, dies, tools, fixtures, jigs, templets, electrical instruments and special test equipment. The single-card system was designed to replace four files formerly in existence.

The system was designed to be used for ordering, initial inspection, inventory control, recording of repairs, cost information, calibration frequencies, source or supplier, serial number, date purchased, part or piece on which instrument is used, actual size of instrument during inspection, and location of instruments.

The card has been most useful for these purposes:

1. Preparation of lists to tell gage inspectors what instruments are due for inspection

2. To aid industrial engineering to determine the availability of gages and comparative costs when estimating

3. Development of gage life data by gage control.

The McBee visible-record system was selected. In this system, the card is designed to be sorted rapidly by: (1) class, (2) location, (3) calibration frequency, (4) part number of piece on which instrument is used, and (5) basic size.

The card system is administered by a record clerk assigned to the gage-control group of the Inspection Section. All requests for information are made to this clerk. He is the only person allowed to handle the cards.

The instruments were studied by groups, and a classification system devised. Within the file, instruments are listed by their class groups.

When the file was set up, a physical inventory of all instruments was taken. Since that time, complete physical inventories have not been necessary. Various classes of instruments are now inventoried yearly on a rotating system.

The record system established a base for further development of the program. The second step was formulation of controls for the use of instruments, and their periodic inspection and repair. The instruments are stored and can be withdrawn from four storage places only by authorized personnel. These storage areas are: (1) Gage-Control Department: (2) Tool Cribs, (3) Templet, Fixture and Die Storage; and (4) Electrical Instrument Storage. Tools withdrawn from any of these areas are recorded with the McCaskey tool-loan system.

The employee must sign a slip for the instrument. The storeroom retains a copy, and the employee is furnished with a copy. When the items are returned, the employee returns his copy, which is matched with a file copy, and the tools returned to storage. Semi-permanent instrument loans are made to the departmental foreman, and he is responsible for their ultimate return.

In the event of instrument damage by an employee's negligence, the cost (up to $25 for each item) is charged against his wages, and the balance is charged against the departmental error account. Outstanding tool-loan checks are audited periodically to insure that the items are not lost.

Whenever an employee leaves a department, his foreman requires him to account for and return all outstanding tools. A note that tools have been cleared is placed on the personnel form used for the transfer.

Periodic inspection and calibration

The first inspection of an instrument is performed when received from the supplier. No instrument is placed in a production area, a toolcrib, a gage station, or other storage area until it has been inspected by the gage-control department.

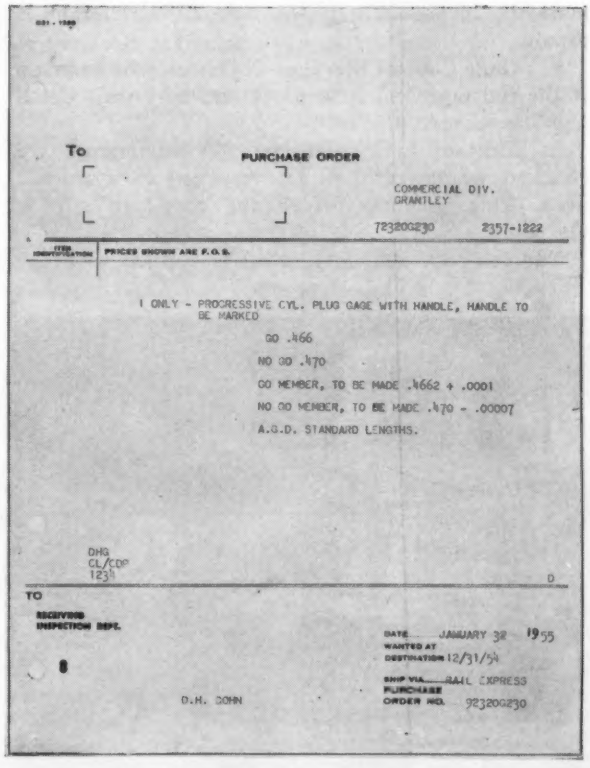
Conformance to this system is assured by sending copies of purchase orders to gage control whenever an order is placed. These are filed by purchase-order number, and frequently checked to insure that none are bypassed.

When an order is received, a copy of the receiving report is transmitted over a TelAutograph system to the gage-control station. Daily the gage-control people go to the reciving area with their TelAutograph reports and collect all of the items designated. The purchase orders on file are matched with the TelAutograph reports to insure that instrument received is idential with the order issued.

Acceptable items are recorded on the McBee instrument-record card. Unacceptable items are rejected, using a standard rejection form, and the purchasing department immediately contacts the vendor for correction.

Acceptable instruments are forwarded to assigned destinations. Instruments assigned to new production are held in an impounding area until released by the industrial engineering department. After industrial engineering approves the application of instruments they are re-impounded until the start of production. At this time they are issued directly to the production area or to the appropriate storage area.

When an instrument is in use, the frequency of



To

PURCHASE ORDER

COMMERCIAL DIV.
GRANTLEY

723200230 2357-1222

PRICES SHOWN ARE F.O.B.

1 ONLY - PROGRESSIVE CYL. PLUG GAGE WITH HANDLE, HANDLE TO BE MARKED

GO .466

NO GO .470

GO MEMBER, TO BE MADE .4662 + .0001

NO GO MEMBER, TO BE MADE .470 - .00007

A.G.D. STANDARD LENGTHS.

DHG
CL/COP
123

TO

RECEIVING INSPECTION DEPT.

DATE JANUARY 32 1955
WANTED AT DESTINATION 12/31/54
SHIP VIA RAIL EXPRESS
PURCHASE ORDER NO. 923200230

8

D.H. JOHN

GAGE PURCHASE ORDER . .

A copy of this form is held by the gage-control section, pending inspection of the item when received. This exhibit shows the standardized writing of an order for plugs and ring gages to values determined from MIL standards

inspection is determined by a standardized listing. Each week the record clerk prepares lists of instruments to be inspected. These lists are forwarded to the gage-control center, where inspectors are assigned to check the instruments.

The gage inspector locates the instrument in one of five areas.

1 . . Tool Storage—No check will be made if the red tape seal is in place and no visible damage has occurred (the instruments are sealed after each inspection).

2 . . Production Line—If the instrument is in use, the gage inspector will replace the instrument with a spare. The gage that had been in use is inspected, repaired if necessary, sealed with red tape, and returned. If no spare is available he will contact the production foreman, to determine when an inspection can be made. In the case of dies and fixtures, a visual check for cracks and broken or loose parts is made on the machine. In addition, careful examination is made of pieces being produced.

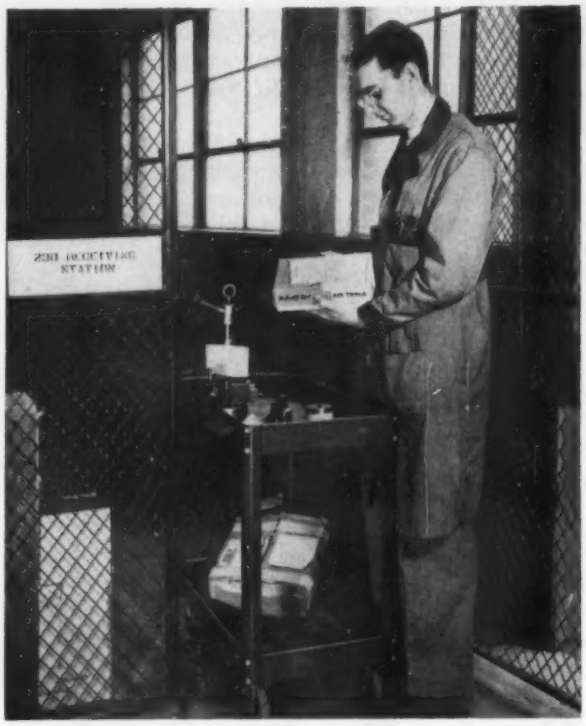
3 . . Maintenance Area—In a coordinated effort between tool maintenance and gage inspection, each instrument is automatically inspected at the completion of repairs, and a red tape seal placed on the instrument.

4 . . Tool Repair Shop—If the tool is out of service for repair, the repair will be noted on the card file and will show when the tool is being repaired and the reason for the repair. The instrument is automatically inspected and sealed at the completion of repair.

5 . . Gage Control Storage—No check will be made if the red tape seal is in place and no visible damage has occurred.

In addition to inspections, all instruments are checked whenever they are returned to a storage area. This is done before the tool-loan slip is cleared.

The red-tape seal mentioned is applied to every instrument inspected. Foremen will not use any instrument that is received without a seal. The seal is removed by the production foreman when the instrument is put into use.



IMPOUNDING AREA . .
Incoming instruments intended for new production are held here with a duplicate of the receiving report

In the case of dies, the area-inspection supervisor is responsible for delivering the last piece produced by the die at the end of each production run to gage control for inspection. In many cases, this piece inspection is made instead of a complete die inspection before storage.

Cutting tools, which have not specifically been mentioned before, are inspected when received or manufactured, and inspected each time they are returned to a tool-repair station for servicing. A periodic report of broken or damaged tools returned to the service area is made to the area production superintendent, to give him an indication of the care being exercised by the operators.

York's own instruments to be used by vendors or subcontractors are checked before release to them, and are rechecked when returned. The card-record system is used to indicate York-owned tools which are assigned to outside contractors or vendors.

Personally owned measuring instruments must be checked as regularly as company-owned instruments. Records of these instruments are maintained by gage control, and their use in the shop is authorized only if they are registered correctly and checked in accordance with this procedure. Each instrument carries a mark of owner identification, and gage control does not perform the inspection service if this identity is lacking.

Gage control assumes the responsibility for clean-

PRESSURE-GAGE INSPECTION . .
Gage is checked periodically at midpoint of use, as indicated by markers. Device carries sticker indicating date of last inspection

AIR GAGE INSPECTION . .
Production air gage is replaced with a spare. After inspection and repair of the "used" gage, it is sealed with red tape and returned to the production area

FREQUENCY OF INSPECTION FOR YORK INSTRUMENTS

(Based on a single shift, 5-day operation. Greater usage, as in two- or three-shift operation, requires more frequent inspection, as noted on the McBee cards)

CALIBRATION INTERNAL	ITEM
Thread ring gages	4 weeks
Thread plug gages	2 weeks
Cylinder plug gages	(Gages with .001 differential—monthly (Gages with .0011 to .004 differential every 2 months (Gages with .004 and up differential and general purpose fractional instruments every 4 months

NOTE: This may vary in individual cases where frequency of use, and abrasive material necessitate more frequent checks.

Micrometers	Weekly (Except personal every 2 wks.)
Dial gages including dial bores gages	Daily—visual (calibrated every 4 weeks)
Comparators	4 weeks
Surface plates, squares, angle plates	6 months
Verniers	4 weeks
Height gages	4 weeks
Snap gages	daily (711 crankshaft line) Prod. weekly insp. 4 weeks
Torque wrenches	Weekly
Straight edges	6 months
Profile gages	6 months
Gage blocks	1 year
Optical comparator	1 year
Optical flats	1 year
Hardness testers	1 year
Profilometers	1 year
Symbol No. instruments	Frequency listed on gage card

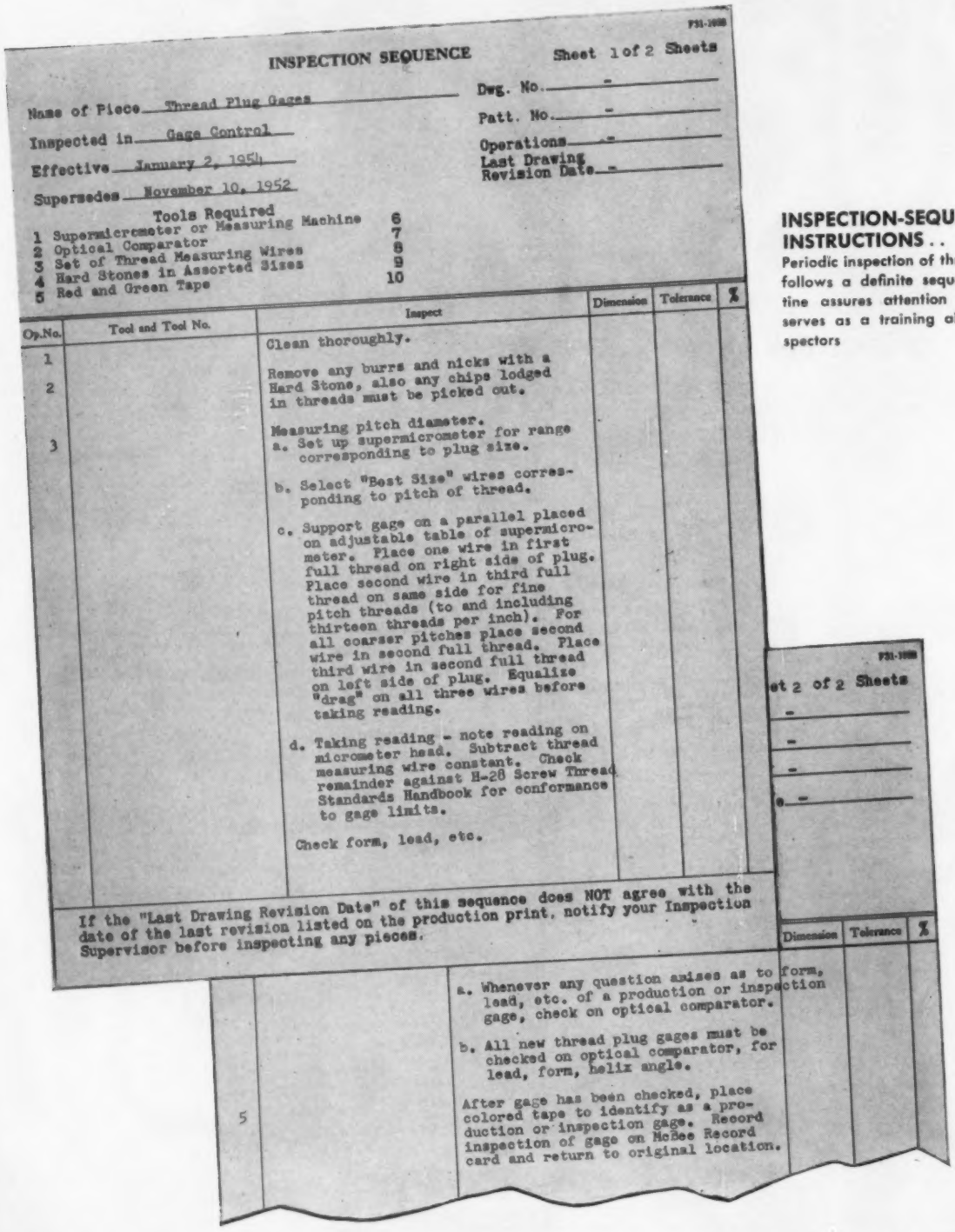
CALIBRATION INTERNAL	ITEM
Masters—Air gage rings, comparator discs, set plugs, and end measures	6 months
Stop watches	6 months
Special instruments not listed above	6 months
Hi-pots	Weekly
Klixon tester	Weekly
Temperature recorders	Weekly
Temperature controllers	Weekly
Motorized valve linkage	Weekly
Potentiometer pyrometer	Weekly
Industrial analyzers	Weekly
Induction voltage regulator	Weekly
Low pressure indicating air operated controller	Weekly
Bridges	Weekly
Condenser Checker	Weekly
Strobotacs	Monthly 1/3 Hrs (Where in constant use)
Powerstats	Monthly
Transformers	Monthly
Hermies	Monthly
Tape Recorder	Monthly
Dynamometer	Monthly
Spring Checker	Monthly
Velometer	
Televac	
Leak detectors	Hourly
Sound level meters	4/times/shift
Wet bulb recorders	Weekly
Watt meters	Weekly
Ammeters	Weekly
Potentiometers	Weekly

ing, checking, adjusting, and making minor repairs to personal instruments which are properly recorded and identified. If an instrument is found to be in a condition requiring major repair or new parts, the employee is reached. If the employee agrees to pay for the parts, the instrument will be repaired. If he does not want the instrument repaired, it is removed from the approved list.

Standardized inspection sequences were developed by gage control. These are written by class and specify what is to be checked on each class of instruments as well as describing how the check is to be made. The sequences also stipulate the accuracy.

These instructions not only insure uniform checking; they provide the method for performing the work rapidly in an organized manner. These sequences also form one of the primary training tools for new gage and instrument inspectors.

Complete equipment for gage laboratories substations, and tool and die repair stations required



INSPECTION SEQUENCE — Sheet 1 of 2 Sheets

Name of Piece: Thread Plug Gages — Dwg. No.: -
Inspected in: Gage Control — Patt. No.: -
Effective: January 2, 1954 — Operations: -
Supersedes: November 10, 1952 — Last Drawing Revision Date: -

Tools Required

1 Supermicrometer or Measuring Machine
2 Optical Comparator
3 Set of Thread Measuring Wires
4 Hard Stones in Assorted Sizes
5 Red and Green Tape
6
7
8
9
10

Op.No.	Tool and Tool No.	Inspect	Dimension	Tolerance	%
1		Clean thoroughly.			
2		Remove any burrs and nicks with a Hard Stone, also any chips lodged in threads must be picked out.			
3		Measuring pitch diameter. a. Set up supermicrometer for range corresponding to plug size. b. Select "Best Size" wires corresponding to pitch of thread. c. Support gage on a parallel placed on adjustable table of supermicrometer. Place one wire in first full thread on right side of plug. Place second wire in third full thread on same side for fine pitch threads (to and including thirteen threads per inch). For all coarser pitches place second wire in second full thread. Place third wire in second full thread on left side of plug. Equalize "drag" on all three wires before taking reading. d. Taking reading - note reading on micrometer head. Subtract thread measuring wire constant. Check remainder against H-28 Screw Thread Standards Handbook for conformance to gage limits. Check form, lead, etc.			
5		a. Whenever any question arises as to form, lead, etc. of a production or inspection gage, check on optical comparator. b. All new thread plug gages must be checked on optical comparator, for lead, form, helix angle. After gage has been checked, place colored tape to identify as a production or inspection gage. Record inspection of gage on McBee Record card and return to original location.			

If the "Last Drawing Revision Date" of this sequence does NOT agree with the date of the last revision listed on the production print, notify your Inspection Supervisor before inspecting any pieces.

INSPECTION-SEQUENCE INSTRUCTIONS . .

Periodic inspection of thread plug gage follows a definite sequance. This routine assures attention to detail and serves as a training aid for new inspectors

a major expenditure. After the general plans and requirements had been formulated, a priority list was developed. The stations were set up according to this priority list. The plan was fitted in with all existing departmental and over-all company expansion plans.

Currently, the plan is reviewed periodically to insure that it conforms with other programs.

Uniform gaging policy

A general policy for instruments was established by mutual consent of engineering, industrial engineering, production supervision, maintenance, purchasing, and quality control and inspection departments. The general policy contains statements like these:

1. "Control by variables is desirable because it provides warning signals before a dangerous position is reached. Control by variables is therefore to be favored over a go-not go system of instrumentation."
2. "When fixed limit go-not go gages are used, the production drawings will specify the actual hole or dimension required, not the gage size."
3. "If gage types are specified for a given part or unit application, the gage or instrument symbol is to be placed on the drawing."
4. "Fixed limit gages are not to be used when the production tolerance is smaller than 0.001 in."
5. "For cylindrical plug and ring gages, the unilateral gaging system will be used, and Mil-Standards 110-111-112-113 will be used for the tolerance application."
6. "Screw thread standards from Federal Service Handbook H28-1944 and 1950 supplement, will be used as the screw thread standard, and a systematic move will be made toward the unified system of thread standards (ASA B1.1—1949 and ASA B1.2—1951)."
7. "In the case of discrepancies between different types of gages, the final decisions will be made by having Gage Control make a laboratory check with gage blocks."
8. "Air gaging will not be used as a final criteria because of the effect of surface finish on this type of measurement."
9. "Specific policies for the various instrument classes will be written according to the mutually established priorities list."

Tolerances

The work on general gaging policies quickly pointed out the fact that we needed tolerance policies which had to be integrated with the gaging policies.

The first step was the writing of a general specification by the quality control and engineering departments, and subsequent review by the industrial engineering, maintenance, purchasing, and production supervision departments.

This specification provides tolerance definitions such as:

"When drawings call for break edge or burr removal, all external sharp corners and edges shall

STANDARD REPAIR TAG . .
Gage Control uses this 2-part tag to authorize repairs to instruments. The "Repair" section is attached to the item, describes the needed repair, and indicates the account to be charged. The "Stop Tag" section is filed until the repair is completed, then is sent to the gage-record clerk

be broken to an approximate radius or chamfer of 0.005 to 0.015 in."

"Diameters of drilled holes may vary ± 0.003 in. up to ½-in. diameter; ± 0.005 in. for ½ to 2 in. in diameter, and ± 0.007 in. for 2 in. in diameter and up."

"When the drawing calls for a lapped surface, the contact area of lapped surfaces shall not be less than 90%."

"Sheared sheet metal up to ⅛ in. thick shall have a dimension tolerance of ± 1/32 in. and for material over ⅛-in. thick a tolerance of ± 1/16 in."

Tolerance specifications for foundry surface finishes, machined surface finishes, surface flatness, and leak detection equipment were among the other general tolerance specifications written. In each case, they provide interpretations for the shop and design guides for the engineers.

The discussions of the tolerance specifications by all interested departments paralleled quality-con-

FIG. NO.	STAMPING ON GO GAGE			TOTAL COMPONENT TOLERANCE	RING DIMENSIONS		FINISH
	RING	ACCEPTANCE CHECK	MAX. COMPONENT DIMENSION		DIAMETER	CHAMFER	
	A	B	C	D	E	F	G
21		7480045	.062	CHECK	.0616 - .0003	.008	8
20	7480046	7480047	.0625	.0005	.0625	.008	4
21		7480047	.0625	CHECK	.0625 - .00004	.008	4
20	7480048	7480049	.063	.0005	.0630	.008	4
21		7480049	.063	CHECK	.0630 - .00004	.008	4
20	7480050	7480051	.063	.001	.06296	.008	4
21		7480051	.063	CHECK	.06296 - .00004	.008	4
20	7480052	7480053	.063	.002	.0629	.008	4
21		7480053	.063	CHECK	.0629 - .00007	.008	4
20	7480054	7480055	.063	.004	.0628	.008	8
21		7480055	.063	CHECK	.0628 - .0001	.008	8
20	7480056	7480057	.063	.006	.0627	.008	8
21		7480057	.063	CHECK	.0627 - .0002	.008	8
20	7480058	7480059	.063	.008 AND UP	.0626	.008	8
21		7480059	.063	CHECK	.0626 - .0003	.008	8
20	7480060	7480061	.064	.0005	.0640	.008	4
21		7480061	.064	CHECK	.0640 - .00004	.008	4
20	7480062	7480063	.064	.001	.06396	.008	4
21		7480063	.064	CHECK	.06396 - .00004	.008	4
20	7480064	7480065	.064	.002	.0639	.008	4
21		7480065	.064	CHECK	.0639 - .00007	.008	4
20	7480066	7480067	.064	.004	.0638	.008	8
21		7480067	.064	CHECK	.0638 - .0001	.008	8
20	7480068	7480069	.064	.006	.0637	.008	8
21		7480069	.064	CHECK	.0637 - .0002	.008	8
20	7480070	7480071	.064	.008 AND UP	.0636	.008	8
21		7480071	.064	CHECK	.0636 - .0003	.008	8
20	7480072	7480073	.065	.0005	.0650	.008	4
21		7480073	.065	CHECK	.0650 - .00004	.008	4
20	7480074	7480075	.065	.001	.06496	.008	4
21		7480075	.065	CHECK	.06496 - .00004	.008	4
20	7480076	7480077	.065	.002	.0649	.008	4
21		7480077	.065	CHECK	.0649 - .00007	.008	4
20	7480078	7480079	.065	.004	.0648	.008	8
21		7480079	.065	CHECK	.0648 - .0001	.008	8
20	7480080	7480081	.065	.006	.0647	.008	8
21		7480081	.065	CHECK	.0647 - .0002	.008	8
20	7480082	7480083	.065	.008 AND UP	.0646	.008	8
21		7480083	.065	CHECK	.0646 - .0003	.008	8
20	7480084	7480085	.066	.0005	.0660	.008	4
21		7480085	.066	CHECK	.0660 - .00004	.008	4

MIL STANDARDS . .
Government standards, known as MIL Standards 110-111-112 and 113, are used to apply tolerances to cylindrical plug and ring gages

trol work on machine and process capability, and developed a fine working relationship between the investigating groups. This relationship carried over into execution of the laboratory-to-production procedure that guides development and production scheduling of York products. Whenever the engineers design new parts for which there is no previous tolerance precedent, they consult with the industrial engineering, quality control, and purchasing departments during the fabrication of initial engineering, models. Tentative tolerances are discussed, and plans are made to ascertain machine capabilities on similar parts over similar existing tools, or to have the tool supplier make capability studies.

As development and trial-lot production progresses, the same group continuously evaluates the tolerance position, and a balance between engineering requirements and process capability is developed. Through this cooperation, practical working tolerances are established with a minimum expenditure for tooling and production operation.

Standards for instrument purchase and design

York design standards are primarily controlled by the gaging policies described. However, this is only a portion of the problem when dealing with large numbers of vendors and sub-contractors, who must correlate their gaging methods and practices with ours.

As part of the quality control operation, we require new vendors to submit a resume of the amount, kind, and specific procedures of their quality control, inspection and testing departments. Likewise, we also ask them to describe specifically their gag-

QC-14C

YORK CORPORATION
QUALITY CONTROL DEPARTMENT

Date 7-4-54

PURCHASED MATERIAL INSPECTION DATA

Vendor: ABC Valve Corp.
1422 West Harrison Ave.
North Orange, Pennsylvania.

1. York Part Name Valve, Solenoid ABC # 2461
2. York Drawing No. 25-7428 PM
3. York Part No. 25-7428
4. York Pattern No. NONE

The following data to be filled in by Vendor –

5. Describe in detail each of the following:

a. Type of inspection made.
Purchased Material Inspection - Visual and dimensional check to drawings.
Production Inspection - Functional checks for operational noise, seat leakage, and external leakage. Visual check at each assembly station.
Final Inspection - Functional checks for operational noise, seat and external leakage.

b. Location of inspection and tests in respect to stages of manufacture.
Purchased Material Inspection - Upon receipt of material and prior to use in production operations.
Production Inspection - Functional checks made on valve sub-assembly; periodic visual check made of performance at each sub-assembly station.
Final Inspection - After completion of manufacture and prior to packaging.

c. Percentage of pieces inspected at each inspection and test station.
Purchased Material Inspection - All parts are inspected to Mil std 105A single sampling plan, Inspection Level II, AQL 1.0.
Production Inspection - Functional checks for operational noise, seat and external leakage - 100%. Visual Checks - 10 sub-assemblies at each sub-assembly station per hour.
Final Inspection - Functional Checks - Random sample of 5% of completed production per hour.

d. Type of inspection equipment used.
Dimensional Characteristics - Ordinary inspection tools such as scales, micrometers, and vernier caliper.
Functional Check: Noise - Electrical supply for cycling valve.
Seat Leakage - Source of air and flowrator to measure leakage in .01 Liter/Min. divisions.
External Leakage - Source of Freon & Air mixture at 300 PSI & GE leak detector.

6. What particular tests or inspection would you suggest that we apply here at York in checking for conformance to drawings and specifications.
Dimensional Characteristics - Small sample to observe damage from shipment.
Functional Checks - We suggest that a small sample of each shipment be checked for operational noise, seat and external leakage. NOTE- Before we take readings on seat leakage, we cycle the valve twice, and then take readings on three consecutive cycles. The readings on the three consecutive cycles must be within specifications.

7. Signed J. H. Jones
Department Chief Inspector.

PURCHASED MATERIAL INSPECTION . .

Before initial shipments are made, vendors are asked to fill in this report. Item 6 is considered especially important, because entries serve to attain a mutual understanding of gaging requirements. Each inspection and test in the vendor's processing must be listed

VENDOR'S INSPECTION CALIBRATION . .

York and the vendor are assured by use of this form that production parts supplied by the vendor are gaged or tested in the same way during York's independent receiving inspection. If different methods are used, there is a chance of rejecting good parts and accepting bad ones

ing and instrument methods. From this initial contact, our quality control and inspection departments work with the vendor through the purchasing department to insure that the vendor and York are using the same instruments and methods, and are interpreting the gaging requirements identically.

The first result of this policy is a much smoother working relationship between our own inspection and purchasing departments. Purchasing had frequently been placed in the embarrassing position of notifying a vendor that his material was defective, and then discovering that the difference was a result of misunderstood gaging policies. The second result is an appreciative attitude on the part of suppliers. Our help often prevents them from making costly errors. The third result is improved operation in our plants, because rejected purchased material has been sharply reduced through the understandings reached.

Where multiple vendors are used, York cross-checks the methods in the various vendors' plants, to insure that an unfair advantage does not exist through different interpretations of York's gaging and instrument requirements.

Occasionally, as a double check, we ask the supplier to send to us the results of his inspection on selected pieces. The same pieces are then re-in-

YORK CORPORATION
QUALITY CONTROL DEPARTMENT
INSPECTION CALIBRATION FORM

Name of Piece Valve, Solenoid ABC #2461

Part No. 25-7428 P. O. No. 12548 Date 7-10-54

Vendor ABC Valve Corp.
1422 West Harrison Ave., North Orange, Pennsylvania

Quantity to be Checked at Random 100

Special Cards Issued # 2401 to 2500 incl.

Form No. Used Q.C. 78

Remarks Attach one special tag to each valve. Test each valve for seat and external leakage. Record data obtained for each valve on its respective special card. Forward this lot of 100 valves to York Corporation marked "Attention Quality Control Section." These valves will be inspected at York for comparison of test results. We will contact you as soon as the final analysis of test results is made.

Vendor's Signature

Return to
York Corporation
Purchasing Dept. (Q.C.)
York, Pa.

CAPABILITY STUDY . .
Tolerances are finally set after sample pieces from the machine are gaged. Here a piston is receiving an OD check to determine whether the tolerances desired by the engineering department can be maintained in production. Byproduct of the study is evaluation of the machine tool for ability to meet York quality standards

spected at York, and the results of the two inspections are analyzed and exchanged. This serves as an audit on both plants.

Government contract gaging

When various government agencies have inspectors stationed within the York Corporation, we solicit their cooperation and ask them if we may check their gages. In most instances, we may not adjust or break the seals on these gages. However, the inspectors are as anxious as we are to assure themselves that their gages are correct, and usually allow us to determine whether or not the gages are within tolerances.

Government agencies and government contracts usually specify certain types of gages. It is imperative that the gages purchased by the contractor be identical with those used by the government. A second consideration is the tolerance the contractor allows himself. Also, because government agencies use gages which, in many cases, may slightly encroach upon the drawing tolerance, it is wise to set slightly more stringent goals for machining.

Operations manual guides procedure

Systems, procedures, and forms involved in the operation of the entire program were written and included in an operations manual. This is used by the gage-control section responsible for the initial and periodic inspection and acceptance of instruments, as well as for the preventive maintenance and repair of instruments. The manual is also used by the tool engineering department, which is responsible for operation of the toolcribs, tool and die repair station, the tool and grinding rooms, as well as the preparation, correction, and maintenance of tool drawings and the design of tools, dies, fixtures, and templets.

Like any other plant activity, the instrument control system is constantly modified to suit our needs. However, the fact that there is a plan has made it possible to know where we stand when a change appears necessary. The system has provided an awareness of position that has simplified the operations of all departments that handle any function involving instruments, Wiser choices of instruments, better use of existing instruments, and a finer relationship with vendors have been products of the system. The clearer understanding of the impact of gaging on tolerances has improved the definition of tolerances, and has evolved a procedure for tolerance establishment.

The decision to adopt a unilateral plug and ring gage policy required a complete study, because of the existing stock of gages, internal differences in policy, existing vendors' gages, and gage suppliers' policies. The details of "Adopting a Cylindrical Plug and Ring Gage Policy" will appear in a second Special Report at an early date.

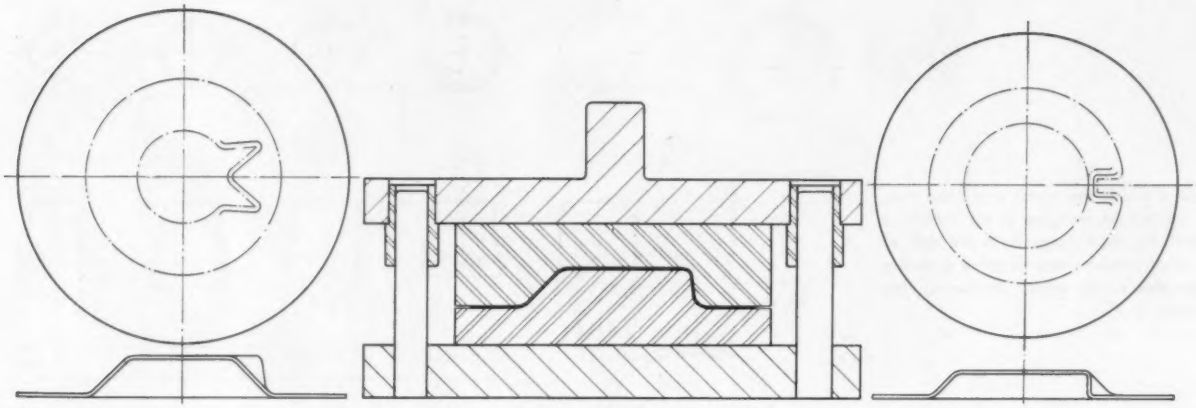


Fig 1 Fig 2 Fig 3

FIGS. 1 TO 3 ... Small projections or pockets in the periphery of a round shell should be reduced in a stamping die, Fig 2. Sometimes more than one reducing operation is required

Cope Talks on Draw Dies ... XXV

How to make shells with ribs, bosses and projections

You can put a rib, boss or projection almost anywhere on a shell by working out a series of operations that allows the metal to flow properly. Sometimes, the operational sequence is altered considerably from that used for symmetrical shells

STANLEY R COPE, president, ACME SCHOOL OF DIE DESIGN ENGINEERING, SOUTH BEND 1, IND.

When a stamping has ribs or other projections around its periphery (Fig 1), it is not usually possible to draw it in one operation from a flat blank, even though the shell is very shallow. If an attempt is made to draw shells of this type in one operation, the metal will be forced to flow over an irregularly shaped drawing edge, because it will be necessary to cut out the die in certain places to make it conform to the shape of the ribs. The shell will probably break, because it is difficult for metal to flow under these conditions.

The shell should first be drawn to a round shape in a first-operation die and then reduced to its final shape in a second-operation die similar to that shown in Fig 2. This die is more of a stamping die than a reducing die, because it simply redistributes the metal in the round first-operation shell to that of a shell with an irregular contour.

If the ribs project a considerable distance from the shell body, or if the space between the ribs is small and in the nature of a pocket, as shown in Fig 3, two or more reducing operations may be necessary. Each preliminary shell should be of a shape that permits changing the round first-operation shell gradually into the final shape, without stressing or fracturing the metal.

Small projections, or lips, similar to those shown on the side of the shell in Fig 4, can be formed by placing the shell on its side in an ordinary stamping die and stamping the lip between solid blocks. If the metal is very thin, or the lip projects a considerable distance from the side of the shell, it must be formed in two or more reducing dies. A round shell having a radius equal to, or slightly greater than, the distance from the center of the finished shell to the edge of the lip is drawn first. This shell is then reduced to its final diameter, but only to the point where the rib starts. The shell is then placed in a third die and the remaining portion of the shell is reduced in diameter excepting in the area where the rib is formed.

In Fig 5 is shown a series of operations for pro-

Republication rights are reserved by the author

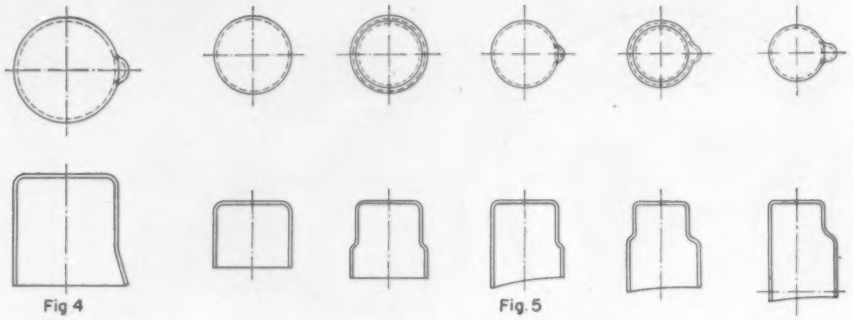


Fig 4

Fig. 5

FIG 4 . . . If the metal is not too thin, a lip can be stamped in the side of a shell. Fig 5—A long rib in the side of a shell requires two or more reducing operations, to avoid fracturing the metal

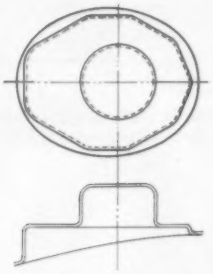
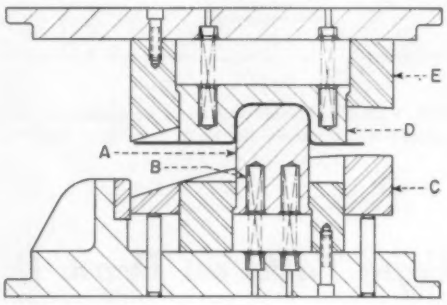


Fig. 6



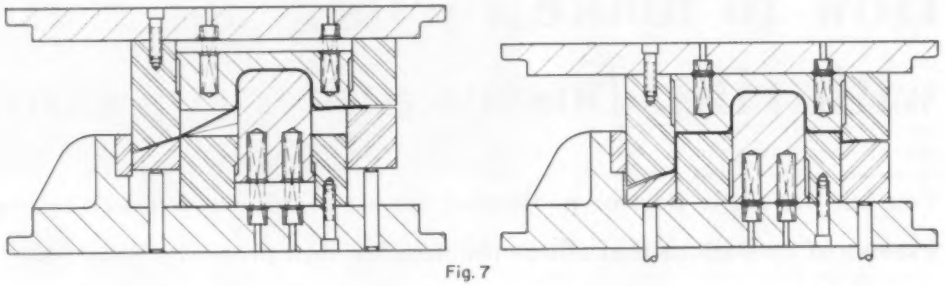


Fig. 7

FIG 6 . . . Flange of shell is not parallel to bottom, and lower portion of shell is not round. Fig. 7—Upper round portion of the shell has been drawn, and now with this portion held tightly, the lower non-round portion and flange are produced

ducing a shell which required two reducing dies to form the lip. In the first operation the shell is blanked and drawn to a diameter of 1¾ in. and to a depth of 1½ in. In the second operation the shell is reduced to a diameter of 1½ in. for a depth of 1 in. In the third operation the shell is drawn off for the remaining distance, except in the area where the lip is to be formed. In the fourth operation the shell is reduced to its final diameter, but for only a portion of its length. In the fifth operation the shell is reduced to its final diameter for its entire length, and the lip is completed.

The metal would fracture if you form the lip of this particular shell complete in one operation, without an intermediate reduction, because the lip is narrow and extends out a considerable distance from the side of the shell.

The shell illustrated has only one projection, but shells with any number of projections can be formed by the same method.

SHELLS HAVING FLANGES NOT PARALLEL WITH THEIR BOTTOMS

The automobile headlight shown in Fig 6 presents a special problem in manufacture, because the lower portion of the shell is not round and the flange is not parallel with the closed end of the shell. If both portions of the shell body were round and the flange were parallel with the closed end, the lower, or larger, portion, could be drawn first. The upper portion of the shell could then be reduced in diameter to produce the final shape. Because the lower portion of the shell is not round, the procedure must be reversed.

It is not possible to draw a non-round shell into a round shape because of uneven metal flow around different portions of the shell's periphery. The smaller, or upper portion, of the shell must be drawn first, and then held tightly in a die while the larger, or lower, portion is being drawn. A die for performing this operation is shown in Fig 7. Special provisions are made in design of this die to hold the previously formed portion of the shell, thus protecting it against distortion. The die is also provided with a heel to prevent the upper die from shifting sidewise and straining the dowels and guide posts. This precaution is always necessary when the work is drawn or formed on an angle.

In operation, the shell is placed over punch *A*. This punch *A* is mounted upon heavy springs *B*, which normally hold the punch in a raised position so that the flange of the shell will not touch pressure

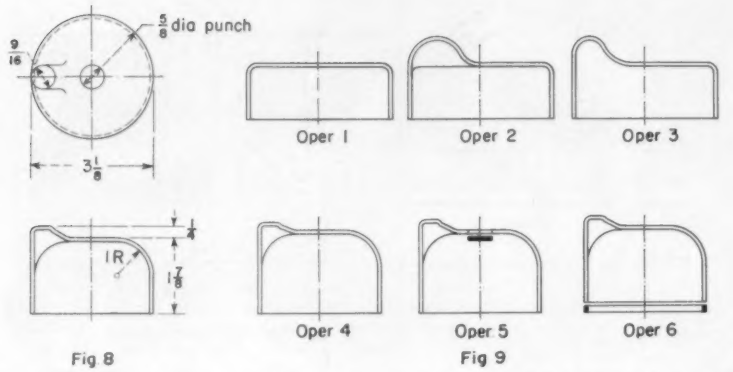


Fig 8

Fig 9

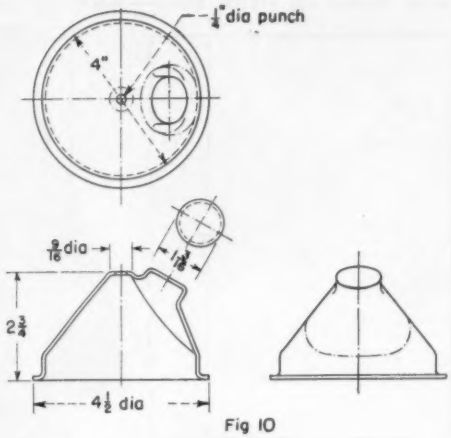


Fig 10

FIG 8 ... A small boss at the side and bottom of a round shell is stretched, then reduced and stamped to size. **Fig 9 ...** Boss-forming operations are performed on a shell larger than the finished size, to minimize thinning the metal. The shell is reduced and the boss stamped to final size and shape at operation 4

FIG 10 ... Because the boss is larger and located farther down the side of the shell than was the case in Fig 8, the drawing procedure must provide metal for the boss. **FIG 11 ...** Metal for the boss is provided by drawing a fairly deep shell, operation 2, then stamping the conical body but leaving a large protuberance for stamping and reducing the boss in fourth, fifth and seventh operations

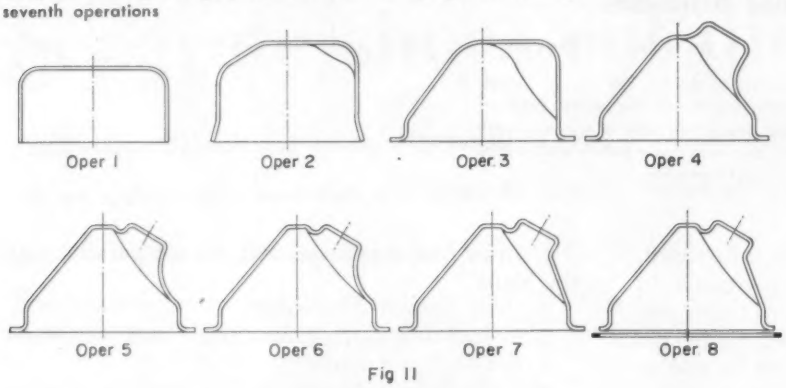


Fig 11

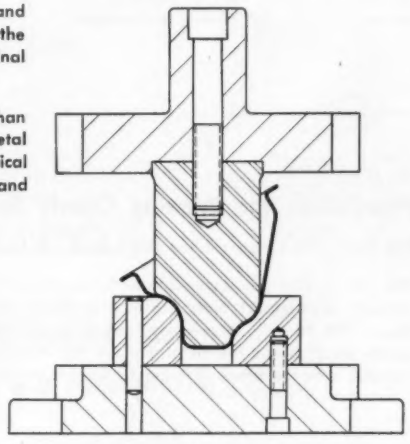


Fig 12

FIG 12 ... Boss is stamped by laying shell on its side with protuberance down in the die

pad *C*. When the press slide descends, spring knockout *D*, which has a hole machined to conform to the previously formed portion of the shell, slides down over the shell and completely incloses it. See first view of the die. Continued descent of the slide causes the springs behind the knockout to compress. Upper die *E* then bends the flange to conform to the shape of the top of the pressure pad. See second view of the die. The pressure pad is then forced down to draw the metal from between the upper die and the pressure pad to form the lower portion of the shell. In the third view the die is shown closed, and with the completed shell in place.

SHELLS WITH BOSSES

Sometimes it is necessary to form a small boss or other projection on one side of a shell, either to provide for an opening or for other purposes. Two shells of this type are shown in Figs 8 and 10. Operation layouts for each of these shells are shown in Figs 9 and 11. The shell shown in Fig 8 is blanked and drawn in the first operation to a diameter of 3¾ in. and to a depth of 1⅜ in. In the second operation a spherical projection is stamped in the bottom. Because this operation is mainly one of stretching (very little metal is drawn from the sides of the shell), the projection is made so that straining and thinning of the metal will be held at a minimum.

In the third operation the projection is reduced to make it conform more nearly to the finished boss. In the fourth operation the shell is reduced and the boss is stamped to its final size and shape. An ordinary single-action, collar-type redrawing die is employed for this operation. In the fifth and sixth operations, the shell is pierced and trimmed.

The shell shown in Fig 10 is made in eight operations, Fig 11. This shell is made somewhat differently from the one previously described, because the body is conical and the boss is larger and is located farther down the side of the shell. The shell is blanked and drawn in a combination die to a diameter of 4 in. and to a depth of 2 in. It is then reduced to a diameter slightly less than that of the finished shell. The shell is drawn with angular corners at the bottom, except around that portion of its periphery where the boss is to be located. This deviation is necessary to provide metal for the boss.

In the third operation, the body of the shell is stamped into a conical shape and the flange is flattened. The shell is then placed on its side in a die similar to that shown in Fig 12 and the boss is stamped to the shape shown. In the fifth operation

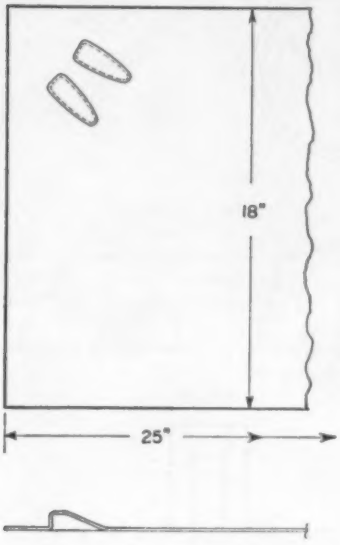


Fig. 13

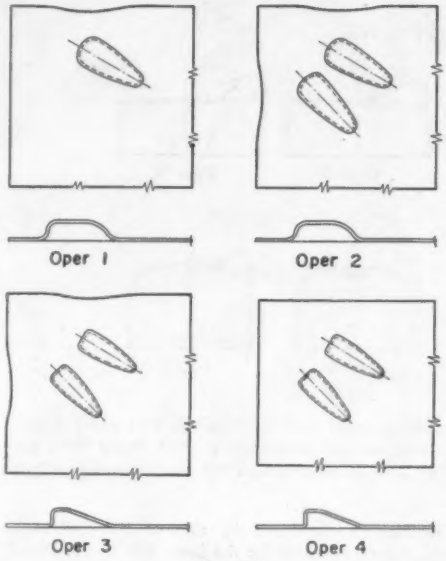


Fig 14

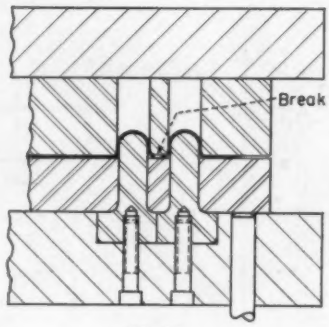


Fig 15

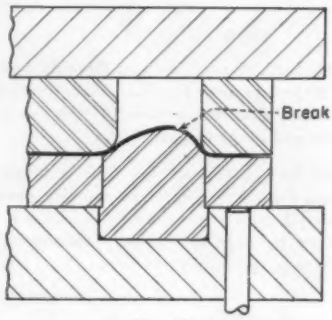


Fig 16

Precautions for Drawing Closely Spaced Depressions

FIG 13 . . . Two nose-shaped depressions are located near the corner of a large blank.

FIG 14 . . . First one depression and then the other must be drawn. **FIG 15 . . .** Simultaneous drawing of both depressions would stretch and break the metal between them. **FIG 16 . . .** A one-operation draw of either depression with a spherical-nose punch would break the metal. For the first operation you must use a punch with a face parallel with the blank in order to lift the metal without fracturing

the boss is reduced, the end of the shell is flattened, and the length of the conical surface is increased. In the sixth operation the body of the shell is restruck. This operation is necessary to size and shape the shell accurately, because the shell lies on its side in the fourth operation and it is not possible to strike the entire conical surface. In the seventh operation the boss is reduced to its final diameter and shape. The flange is trimmed and a hole is pierced in the bottom of the shell in the eighth operation.

TWO SHELLS CLOSE TOGETHER

Sometimes it is necessary to draw two depressions close together in a large blank. This is a simple problem if the metal is thick and the depressions can be stretched without drawing metal from the outside of the blank. However, when the depressions must be drawn, that is, metal must be pulled in from the outside of the blank, the problem is usually difficult.

An extremely difficult stamping of this type is shown in Fig 13. The two nose-shaped depressions are located in the corner of an 18x25-in. blank. These conditions do not permit drawing the metal in from all around. The stamping is further complicated by the odd shape of the depression. Shapes of this type are difficult to draw, because nose-shaped punches are not flat on their tops and they have small areas there. Such punches have a tendency to break the metal.

In this case, both depressions were drawn and stamped to specifications in four operations:

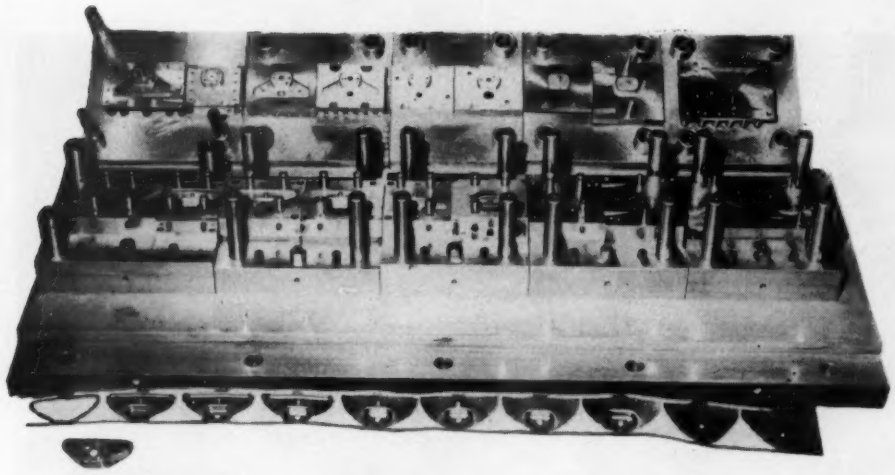
1. Draw first depression with flat top parallel with the blank
2. Draw second depression
3. Reduce and stamp excess metal back into blank
4. Set radii and stamp

The stamping is shown in Fig 14 as it appears after each operation. You will notice that the first-operation shells of both depressions are drawn in separate dies. This is necessary to permit each depression to gather metal from the outside of the blank without interfering with the other depression. If an attempt is made to draw both depressions at once, the metal will stretch across the tops of the punches and break, as shown in Fig 15.

The first-operation shells are drawn with flat tops, which are parallel with the surface of the blank to provide a greater lifting surface. If you attempt to make the first-operation shell of the same general shape as the finished shell, as shown in Fig 16, the spherical-shaped end of the punch would fracture the metal.

In the third operation both depressions are reduced in size and the excess metal at the back of each depression is pushed back into the blank so that the depressions conform more nearly to the finished shapes. Both shells can be reduced simultaneously in the same die, without interfering with each other, since the necessary metal has already been gathered from the outside of the blank in the first-operation dies.

Part XXVI of Mr Cope's series will appear in an early number.



SEPARATE DIE SHOES containing two stations each permit development of individual stations in building this 96 in. long, 9800-lb progressive die. Shoes are fastened to a bolster with screws and dowels to insure accurate relocation when individual stations are removed and replaced. Maintenance of the die is also facilitated because worn sections can be replaced without moving the whole die

Separate shoes cut die cost

Progressive dies are not necessarily tough to build or repair. Here's one that makes use of standard commercial die shoes to simplify construction and maintenance

DANIEL KARPINSKI, WESTLOF TOOL AND DIE CO, DETROIT, MICH

The various means devised to simplify and speed accurate construction of progressive dies usually provide some degree of help for the ultimate user, too. He is the one who must regrind worn sections or replace broken ones as necessary. For the average small progressive die this maintenance is not much of a problem because the die can be taken out of a press, loaded onto a table and rolled to a bench where the bad section is removed easily. However, when dies get big—running around 100 in. long—they must be built so they can be handled. In addition they must be so constructed that development of the different stations can be made without hauling the whole die around.

One way to do this is by means of individual shoes, each containing two or more stations, mounted on a bolster. A die with this feature was built to produce automotive speedometer cases from cold-rolled sheet strips 0.0295 in. thick. About 96 in. long, it contains 10 stations and weighs around 9800 lb. assembled. Five shoes are used, all but one having four guideposts and each one containing two stations. For precise alignment at the final stations, a 3-post Lempco ball bearing dieset is employed.

Hardened and ground sections make up each station. The first two and last two are high-carbon, high-chrome steel, those in between being made of an oil-hardening graphitic steel, (Graph-Mo), to facilitate drawing operations.

In the first station, the strip is pierced and notched, the resulting hole being used for piloting and extruding in the second station, which is otherwise idle. At the third station the first cup draw is made, again using a pilot. The cup is approximately 2¼ in. wide, 3¼ in. long and ¾ in. deep. A second draw is made at the fourth station. Actually this amounts to an ironing operation because no greater depth of the cup is achieved, but it is reduced in size to prepare it for forming a bump—now being about 2 in. wide and 3 in. long. The bump is formed in the fifth station and reduced in size, or ironed, in the sixth.

A large pocket, about 7/16 in. deep, is drawn in the seventh station where the bump is further reduced. At the eighth station the whole form is restruck to sharpen all corners and bring the part within print dimensions. Next the remaining holes are pierced, and finally the finished case is blanked out in the tenth station. Parts drop through the bolster into a chute that carries them through the bottom of the press into pans. The die was designed to operate at 27 strokes per minute with the stock fed from a roll.

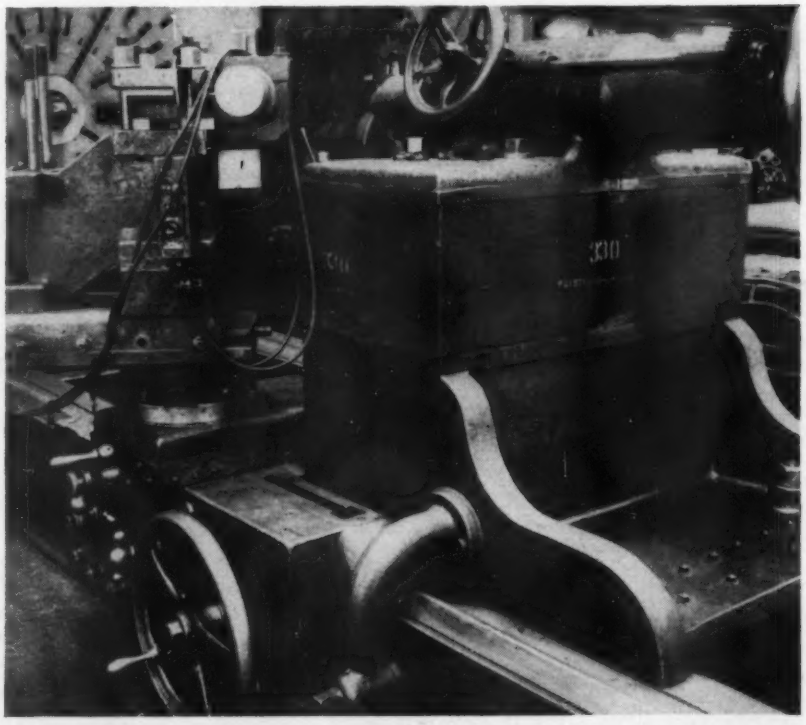
A special advantage of the separate die-shoe construction was that it permitted the builder to try out two or four, (or more), stations in a small press. In this way, he could make corrections or adjustments to these sections without moving the whole die or being concerned about misalignment. The shoes, of course, are screwed and doweled to the bolster to permit accurate relocation.

INDEFINITE BED LENGTH was acquired for this engine lathe by sinking studs in floor to which short bed section can be bolted. This is shifted as required to suit work length. Wooden cover protects studs beyond lathe from damage

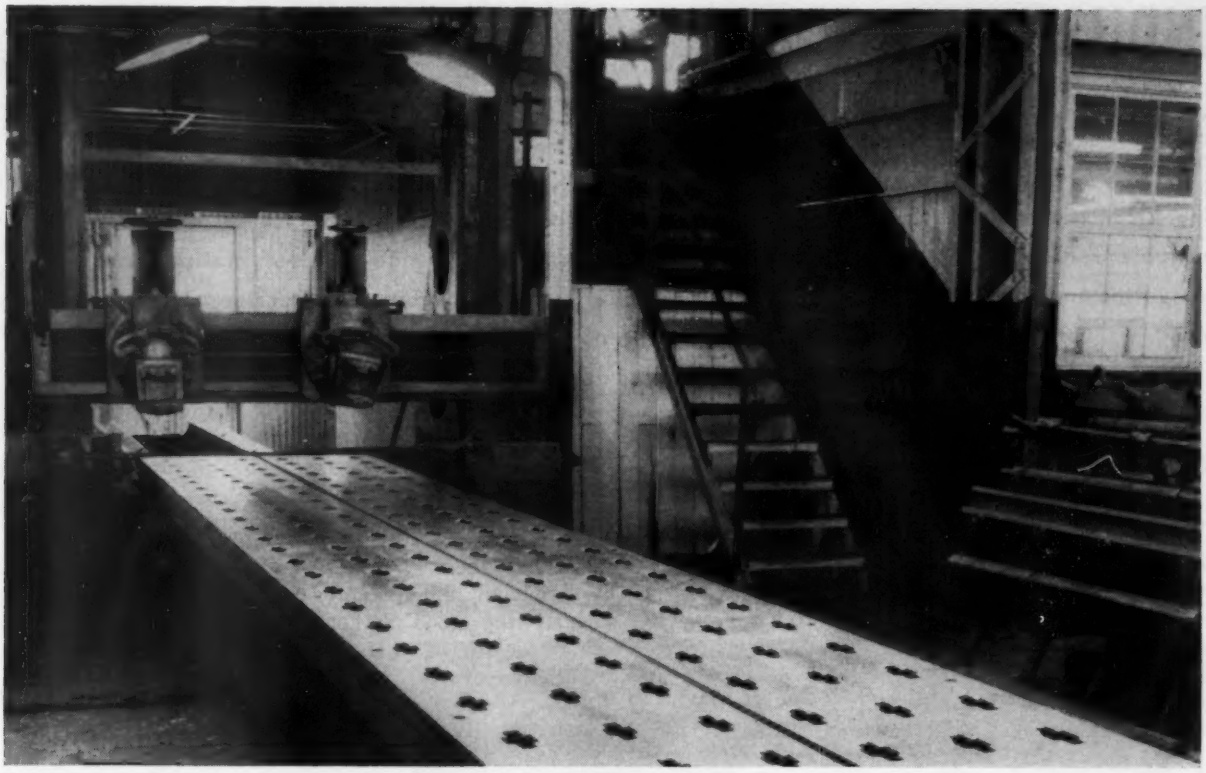
Giant job shop

Five companies joined forces to form General Iron Works, Denver, Col, to handle their large machining and foundry operations. With Stearns-Roger Mfg Co as general manager, the others include Dorr Co, Mine & Smelter Supply Co, Vulcan Iron Works, and Colorado Iron Works.

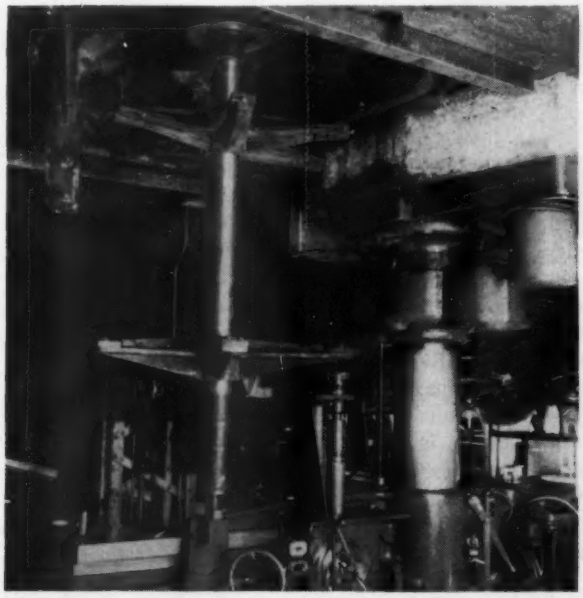
Still specializing in big and unusual fabrication, largely for the mining and petroleum industries, General Iron Works is a true job shop on a giant scale. In a recent expansion program, for example, the plant not only fabricated and erected the building extension, but also built all the machines going into the new area of the plant.



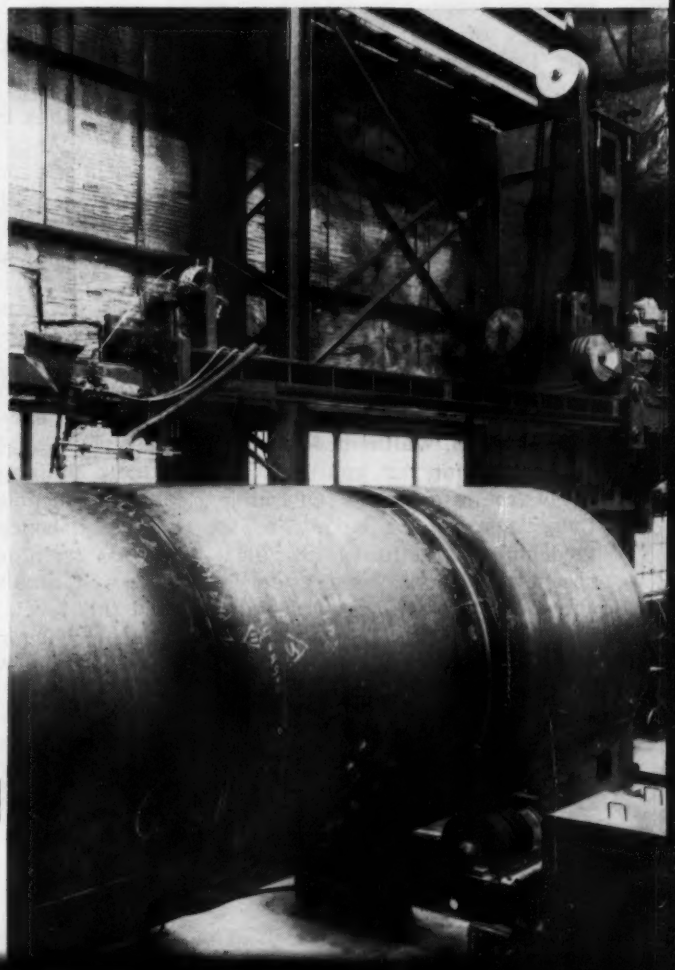
INCREASED SWING OF LATHE is obtained by inserting "raising blocks" of required height into head, toolpost, and tailstock. Although pit lathes that will swing work to 30-ft dia are available in the plant, the larger engine lathes (this one now swings 84 in.) are needed for many jobs



INCREASED SPAN between side columns of 24-ft planer required an extension block bolted into head. Rail was cut and similar extension welded into place. Now work 6 ft 10 in. wide will clear the columns



MILLING OPERATION on contour on end of small tank is handled by radial drill. A pit dug behind drill holds rotary table with spiders to clamp and rotate work. Arm of drill is swung over pit and positioned so center attached to arm locates in end of shaft holding spiders. Milling cutter chucked in drillhead can follow required contour by feed and traverse adjustments on head



WELDING GANTRY has 21-ft unsupported arm to handle longitudinal and circumferential welds on pressure vessels. Turning rolls for positioning work are controlled by operator from welding head

INDUSTRY ASKS:
are blind machinists

Most companies employing the blind will confirm that they are not only safer, but more reliable and productive than the average sighted employee. Despite this confirmation, many potential employers of the blind need considerable convincing. Here we describe a training program for machinists, where you might expect more than average hazard, that was 100% accident-free, plus some of the tools that permit accurate work by touch

DR CLIFFORD M WITCHER, Research Laboratory of Electronics, MIT, CAMBRIDGE 39, MASS

Your reaction to the title of this article may range from amusement to thorough disbelief. Who would be fool enough to attempt to operate a metal-cutting machine tool with his eyes closed? Nevertheless, it is most assuredly true that blind machinists are operating machine tools, producing accurate work, and working at least as safely as their sighted companions. Only the blind person who has lived with his problem long enough to achieve self-confidence, long enough for his other senses to compensate for the lack of sight, can appreciate how little danger results from his blindness in tasks that he has been trained to fulfil. It has been said that one reason employers hesitate to hire a blind person is that they have never been blind. Because the employer depends upon his own sight, he cannot believe that anyone else can function normally without sight.

For example, a group of seven blind men completed a thorough course in basic machine shop practice last August at the Waltham Trade School, Waltham, Mass, and the record for this course is entirely free of accidents. Of course, these men cannot be classed as "machinists" in the specific sense recognized by you as a reader of this magazine, but there is certainly no reason, now, why they may not continue their training and experience until they reach that level. Every one of the seven men can operate all of the basic shop machine tools as well as file and fit. And very little modification is necessary on the machine to make this work possible. Others before them have become proficient mechanics, even without the good fortune to receive a systematic basic course to start them on their way.

So far as we know, this course was the first of its kind ever to have been offered to the blind. The man largely responsible for its conception and organization is Robert Scott, totally blind placement counsellor with the Massachusetts Division of the Blind. Although no machinist himself, Scott had had some experience in working with power tools and also knew of numerous examples in Industry. To him, therefore, it seemed entirely logical to undertake a genuine investigation of the possibilities of the machine shop field as an employment opportunity for the blind.

As is well known, employment of blind workers in *routine* shop operations, such as assembly, drill-press work with standard jigs, punch press operation, and various kinds of manual feeding tasks, is not new. Training courses for these jobs are not new either. However, the initial concept of the Massachusetts training experiment and the result obtained went far beyond this level.

The instructor selected for the course, James Westall, was eager from the outset to make it a success. Although an experienced teacher of machine shop practice to students with normal sight, he had no experience whatsoever in working with the blind. Prior to the start of the course, he conferred many times with Mr. Scott and others who could help him acquire the specialized knowledge which was needed for this program. His attitude toward the students was an admirable combination of kindness, common sense, firmness, and a business-like application to the job at hand.

The seven students were selected, on the basis of job needs and general qualifications, from the Massachusetts Division's roll of blind clients. They came from various communities throughout the state and the course was financed on a share basis by the state and these communities.

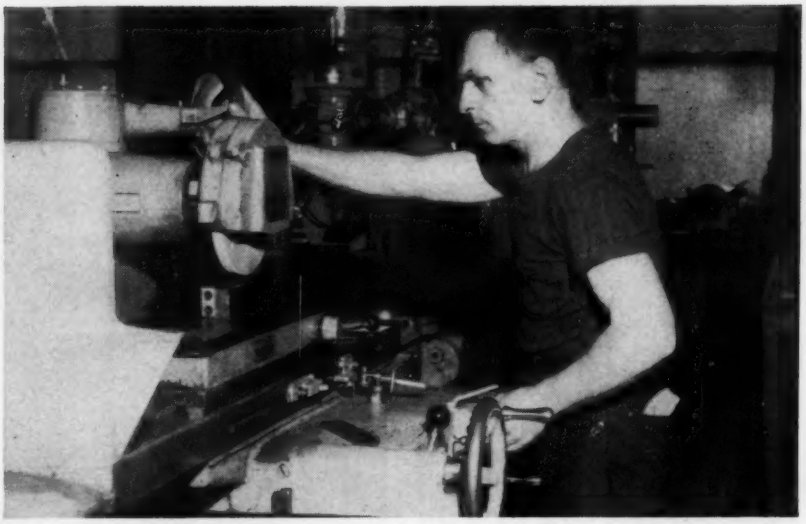
The only special tools used by the students were micrometers modified for touch reading and "Rotomatic" depth gages, the latter to permit length measurement up to 12 in. with an accuracy of 1/64 in. or better. Because the American Foundation for the Blind was out of stock on its standard touch-reading micrometers at the time they were ordered, the members of the machine shop of the Research Laboratory of Electronics, MIT, agreed to produce them. (*Sight at Your Fingertips*—AM—Jul 28, '49, p 100) So cooperative was the shop that before the micrometers were completed the adaptation parts had been completely redesigned and materially improved, largely with the help of John Keefe, shop foreman, and Frank Bunick, an instrument maker, plus some suggestions from me.

safer?

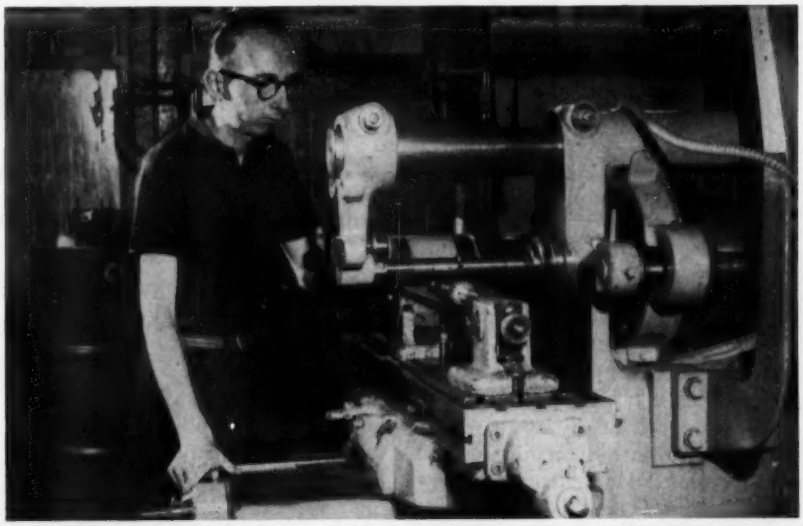
Only two modifications were made on the shop machinery. An extension shaft was attached to the bench grinder so that a blind student could tell whether or not it was running, in the midst of shop noise, simply by touching the shaft, and raised markings were added to the micrometer stops on the lathe. As had been surmised from the outset, there was no need to provide raised markings on the feeds of lathes, milling machines, grinders, etc. By appropriate use of the modified micrometer and depth gage, plus a feeler gage and a few pieces of shim stock of known thickness, students had adequate knowledge of tool and work relationship. Of course, after they learned the "feel" of each machine, the students were able to estimate, in most cases, with fair accuracy just about how many thousandths of an inch they had moved a feed.

Some work on practically every machine in the shop was included in the course, plus practice at shop calculations. Machine tools included lathes, drillpresses, milling machines, shapers, bench grinders, surface grinders, and bandsaws. Students produced usable items such as screw drivers, ball peen hammers, bench blocks, and even toolmaker's clamps, all of which they were allowed to keep when the course was completed.

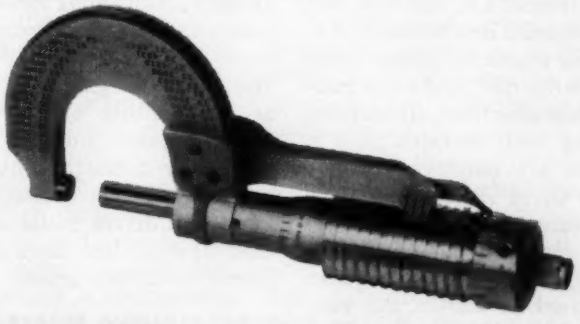
It has long been recognized by employers of the blind that the accident rate among all types of blind manual workers is far below that for seeing workers in corresponding jobs. The reason: A blind person's hands are his most precious possession, thus before a blind employee begins to work with any tool or machine he will note with the greatest care the location of all danger points and will thereafter make very sure that his hands do not approach too close to these points without caution. Also, he is extremely careful to keep a work area neat and uncluttered, with every tool in its proper place.



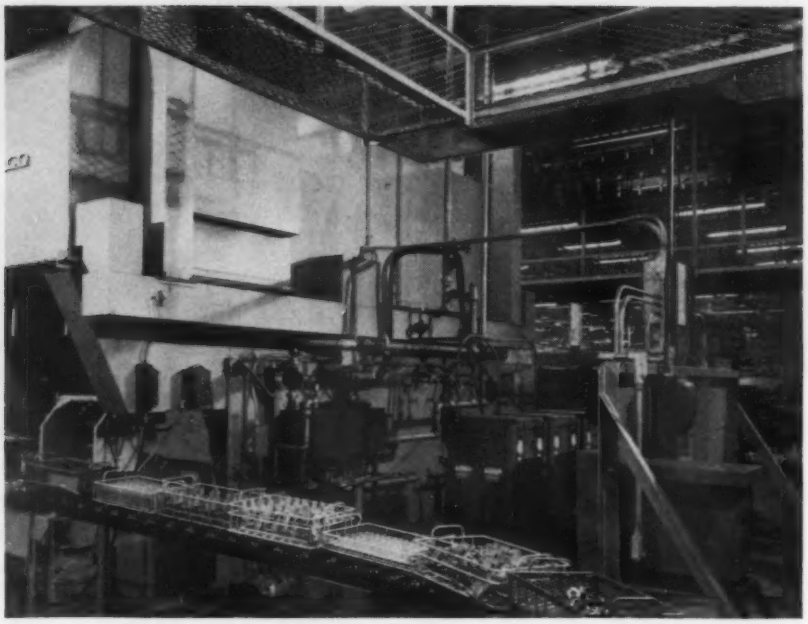
SOUND AND TOUCH compensate for lack of sight as this blind student works to accurate dimensions on a surface grinder. No special modification of the machine was necessary to permit operation by a blind person. In spite of seemingly hazardous occupation for the sightless, accident rate was zero for the course



MILLING TEETH IN A SPUR GEAR, blind operator indexes blank with a dividing head and manipulates feed by feel. Once he has set up job and knows exact relationship of all operating elements, only occasional checking with feeler gage and micrometer is necessary to turn out accurate piece. Very little special supervision is necessary



FOR TOUCH READING, standard micrometer is adapted with bar and thimble. Raised lines on barrel are 0.100 in. apart and those on vernier index arm are 0.075 in. apart. This arrangement permits reading to nearest 0.025 in. Raised graduations on thimble, together with thimble index (designed to slide in or out of index arm) permit direct reading to 0.001 in. and interpolation to about 0.0002 in. A variety of touch-reading tools, including a similar micrometer, are available from The American Foundation for the Blind, New York, NY



ULTRASONIC CLEANING MACHINE removes last vestiges of dust and dirt particles as well as microscopic contamination from all areas of valve parts, including deep recesses. Work is automatically loaded, carried through three separate stages including an ultrasonic chamber where transducers are installed. Clean, dry parts are automatically unloaded into conveyors for transfer to assembly

Ultrasonics and automatic handling

Last traces of oil, dirt and grease are removed from precision hydraulic steering parts at Saginaw Steering Gear in a new machine that is loaded and unloaded automatically. Here's how it's done

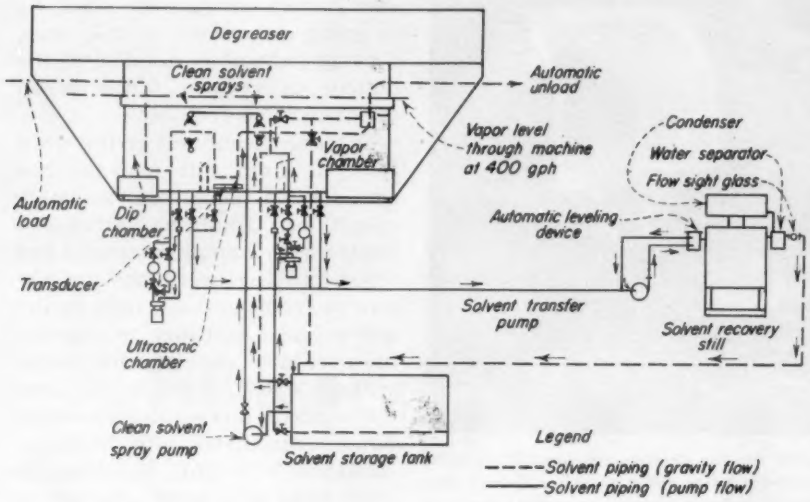
Cleanliness is nowhere more important in Metalworking than it is in hydraulic steering parts where a sticky member can cause malfunction of a power steering unit. Great care has always been exercised at Saginaw Steering Gear to be sure that every hydraulic steering unit made was foolproof from this point of view—now the problem has been simplified and cleaning made even more effective. Process engineers working with Circo Equipment Co, Rahway, NJ, have developed a new machine that removes all traces of foreign matter, machining dirt, and even microscopic particles from all surfaces —including deep recesses.

The trick is to employ ultrasonic energy to drive molecules of the cleaning solvent into the part to produce a scrubbing action obtainable in no other way. Soundwaves are generated by 2x3-in. flat barium titanate transducers, three sets of ten each, immersed in trichlorethylene. The transducers are molded of polycrystalline ceramic whose multi-directional crystals are polarized for alignment in one direction by placing them in a strong electric field. This field is provided by three 2-KW generators, one for each set of transducers. Under the influence of electricity, the transducers change dimension, contracting and expanding as the alternating current changes polarity. As the transducers expand and contract at ultrasonic frequency (200,000 cps in this setup), they propel sonic energy with tremendous force in liquid layers to set up pressure fluctuations of considerable magnitude. The liquid is torn apart and air or gas bubbles are created and collapse violently during each positive phase as the polarity is rapidly changed. This cavitation is the force that drives molecules of trichlorethylene into the work for the severe scrubbing action.

THREE CLEANING STAGES

After being automatically loaded, the work first passes through a vapor level to enter an immersion stage or sump. Here trichlorethylene is boiled at 188 F to provide vapor through the machine. It is here that the heaviest dirt is removed, therefore the solvent is filtered to 10 microns by pumping it out and back again every three minutes at a rate of 30 gpm. Cartridge-type "Full-Flo" filters are employed here as well as in the next stage where the ultrasonic transducers are installed.

After a 30-sec immersion, the work is raised from the sump and carried past clean solvent sprays. These direct clean, distilled trichlorethylene to the work as an added cleaning cycle to remove metal chips and soils not handled by the vapor and immersion. Solvent for the sprays is supplied at 600 gph to the storage tank from the vapor-level condensing coils in the sonic unit and the trichlorethylene still. Before reaching the sprays, however, the solvent is cooled from 188 to 130 F by means of heat exchangers. The solvent-recovery still provides 200 gph, and the sonic unit provides 400 gph of clean trichlorethylene to the



THREE SEPARATE STAGES are employed in cleaning valve parts. First the work is lowered through a vapor level into an immersion of boiling trichlorethylene in the dip chamber, where it remains for 30 sec. A clean solvent spray follows, after which it is carried to the ultrasonic chamber and dipped in trichlor again for 20 sec. Following this scrubbing action is another clean solvent spray, then the third stage—the vapor chamber where boiling trichlor vapor brings the parts up to vapor temperature leaving the parts clean and dry. The solvent in the first and second stages is constantly recirculated through magnetic and cartridge-type filters. The solvent still can pump solvent from any one or all three stages. Condensate from the still flows to the storage tank which supplies clean solvent to the sprays. Excess is piped to the ultrasonic stage. Overflow from this chamber enters the immersion chamber and this, in turn, overflows to the boil chamber from which solvent is piped to the still

clean valve parts

VIRGIL V SABOURIN, process engineer
Saginaw Steering Gear Div, GENERAL MOTORS CORPORATION

storage tank for delivery to the sprays. The still pumps solvent from the third stage of the unit (although it can be arranged to draw from any other, or all three, stages). Distilled solvent delivered to the storage tank is not only pumped to the sprays but the excess not sprayed is gravity fed to the ultrasonic chamber. Overflow from the sump goes to the third or boil stage through a gravity-flow return pipe so a constant recirculation of clean solvent is provided.

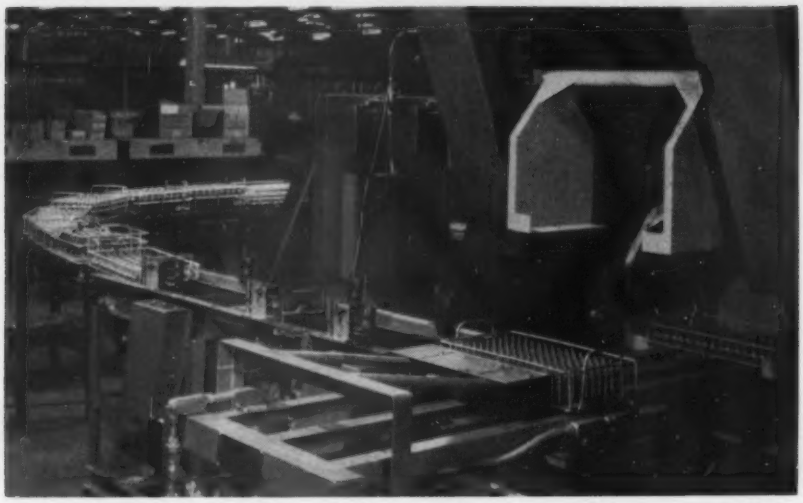
After being sprayed, work is carried to the second stage where the transducers are installed and trichlorethylene at 140 F is maintained. Here the scrubbing action previously described is produced, the 140 F temperature having been found best for maximum operating efficiency of the transducers. Work remains in this bath for 20 sec before being carried through another set of clean solvent sprays and finally out of the unit through solvent vapors, the sixth cleaning cycle. "Carry out" of solvent is kept at a minimum by bringing the parts up to vapor temperature in this stage. This eliminates further condensation of solvent vapor on the work, which is removed in a perfectly dry, clean state.

STAINLESS STEEL AND AUTOMATIC HANDLING

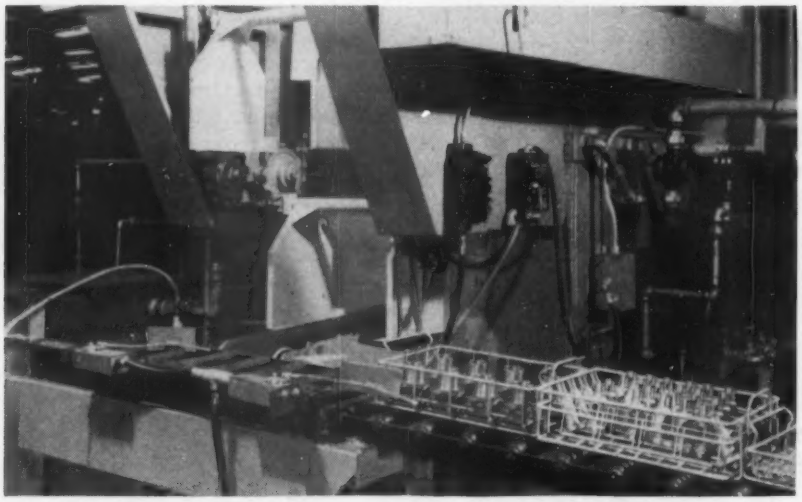
The entire machine except the hood is made of stainless steel to insure long life and minimum maintenance. This expensive material circumvents the possibility of trichlorethylene getting out of control. Dirt and water (for which trichlor has a great affinity) combine to form hydrochloric acid which quickly corrodes metal. Should this acid form in a machine made of conventional materials, costly scrubbing and replacement of expensive parts is usually necessary. Hangers, or work carriers, are cold-rolled steel, sprayed with zinc. This prevents rust and corrosion.

Automatic handling of the parts is provided by conveyors and mechanical handling equipment at both ends as well as through the machine. Work from the machining line is conveyed to an inspection area where it is checked, then loaded into baskets for transfer to the sonic unit on gravity-feed roller conveyors. The roller takes the baskets as far as a belt conveyor at the load end of the machine. The first section of this power-driven conveyor stops basket travel by means of friction when it is not moving, thus preventing arrival of the work at the load end until the area is clear. One basket at a time is shunted into the loading mechanism by means of the second section of belt conveyor. The loading shuttle, operated by an air cylinder, transfers baskets to a position in the machine at which chain-driven hangers pick them up—one at a time. A limit switch actuates the shuttle cylinder when a hanger is in the loading position—being in series with another that is tripped by the hanger as it approaches this position.

Hangers carry the baskets of work through the machine to unload at the opposite end. Here a short belt conveyor receives a basket and delivers it to a power roller conveyor running at 90° to the axis of the machine. This transfers work to a gravity-feed roller conveyor that carries it to in-



BASKETS OF WORK ARE AUTOMATICALLY LOADED into the cleaning unit immediately after machining and inspection. Baskets are transferred from free roller conveyors (where they were loaded at inspection) shunted to a shuttle mechanism by power conveyors, one at a time. Limit switches in series on chain-driven hangers and shuttle prevent positioning a basket for pickup until a hanger is in proper position. Hangers carry the baskets through the machine and out the other end, where they are unloaded



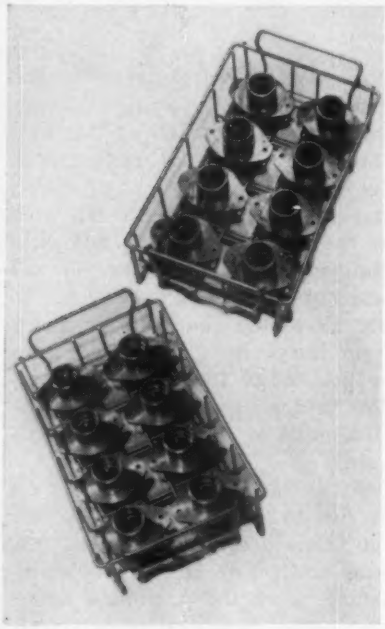
AUTOMATIC UNLOADING for transfer to assembly employs a power-driven belt conveyor at the end of the machine. Baskets are removed from hangers here and shunted to power roller conveyors which transfers them to a free roller conveyor leading to assembly lines. Limit switches prevent baskets from backing up and jamming unload mechanism if work is not removed from conveyors fast enough. One at end of power roller conveyor trips to allow one more basket to be unloaded if works backs up. Second limit switch trips to shut off hanger drive after last basket is unloaded

dividual conveyors that supply assembly lines. Limit switches on the power roller conveyor prevent baskets from backing up and jamming the unload station. When the baskets are backed up to the end of the free conveyors, a limit switch at the end of the power conveyor is tripped to allow one more basket to unload. Tripping a second switch at the opposite end of this conveyor (where work leaves the machine), shuts down the unloading mechanism, which is not started again until baskets are removed from the free conveyors at assembly.

ASSEMBLY SIMPLIFIED

Other features include lip exhausts at the entry and exit ends of the machine that can be used to draw off vapor that has escaped past the condensate coils and prevent it from entering the plant. As in many degreasers of this type, a purge exhaust is installed at the bottom to remove fumes when maintenance is required.

Extreme cleanliness of the work received from this machine has considerably simplified assembly operations. Usual fine particles of matter from lapping compound and other finishing operations are absent so spools, pistons, rods, bodies and cylinder housings go together more readily and function better without extra attention. A great difference in this respect was noted almost immediately after initial installation of the unit. Excellent results have also been obtained in cleaning aluminum and malleable-iron parts as well as steel. Capacity of 5 tons per hour leads us to expect that a wide variety of parts in addition to valve components will be cleaned successfully in the machine.



RESULTS ACHIEVED BY ULTRASONIC CLEANING. Hydraulic pump bodies at top are typical of work as it appears immediately after normal machining operations. Similarly machined parts below have completed ultrasonic cleaning process—are free of all dirt including microscopic particles in deep crevices. Parts such as these are easier to assemble because they fit better and last-step removal of such clinging foreign matter as lapping compound is eliminated

Round Table

Picnic or clicqnic?

"We ought to get the men and their families better acquainted, Ed. What say we plan a picnic for some day later in the Spring?"

"Why?"

"Well, to get everybody to know each other better, and to build up company relations. . . . What do you mean, 'why?' "

"Just that, Al. Why do we have to make the men get to know each other better? I assume that most of them know the other men they have to deal with. Why not let it go at that?"

"Well, don't you want to know your men better?"

"I certainly do not. I know them well enough; I know who can do what, and I know how fast. I really don't give a damn about their social lives."

"I'm surprised at you, Ed! I know you get along with your group as well as any foreman in the plant. You sound as if you didn't like people, and I know that's not true."

"Of course not, Al; but I don't want my nose rubbed in anybody else's business, asked or not. And I try not to stick my nose in their business. I get along with my gang, and I think part of the reason is that I leave them to heck alone when things get personal."

"I didn't mean to get nosy, Ed. I was just thinking that a plant picnic would spice things up a bit—add to good fellowship and all that. You've assumed I wanted everyone to get regimented into a group deal that nobody would like. I was just hoping to promote good will."

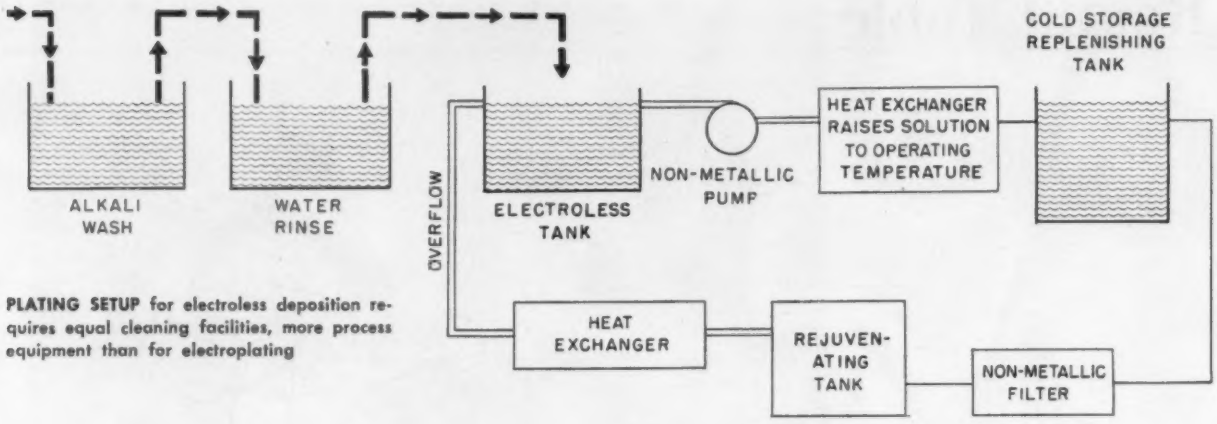
"Look, Al. The main objection I have to a company outing is that everyone *has* to go, like it or not. I'd much rather see a bunch of the boys just get together themselves and plan an outing. If they want to include everyone in the shop, OK. If not, they can choose their own friends. What's wrong in that?"

"Well, maybe it might lead to cliques, and that's not good, Ed. If we make it an official company outing, then everyone goes, and nobody gets hurt feelings."

"Personally, I'd get hurt feelings if somebody said I *had* to go. I don't like mixing personal life and work life together."

"I'll go talk to someone else, Ed. You're too touchy for me."

IS ED ACTING LIKE A GROUCH, *or is he right in trying to keep work hours and off hours separated? Would Al's idea be a good one for company morale? Your opinions could help others with this problem.* *Discussions of earlier topics start on page 204.*



PLATING SETUP for electroless deposition requires equal cleaning facilities, more process equipment than for electroplating

Electroless nickel plating evaluated

There has been a lot of interest, and some hot words, over the merits and demerits of this process. Here is an analysis that may answer your questions

JOSEPH HAAS, industrial engineer, LABORATORY OF ADVANCED RESEARCH, REMINGTON-RAND, SOUTH NORWALK, CONN

In the spring of 1953, there appeared advertisements of the development of a new, sensational improvement in the deposition of nickel upon metals. Among claims made for the process were:

Saving of one-half to two-thirds of the nickel required for electrolytic deposition.

Absence of porosity to the extent that a specification of one pore per sq ft would be a liberal allowance; a difficult if not impossible specification for electroplating.

That it was not an alternate or substitute process, but a new type of metallic deposition with advantages and properties of its own, many of which provided values otherwise unobtainable.

That through the research efforts of the advertiser, the process was made possible and available to more than 100 industries which, up to this time, were at a loss on their metal-deposition problems.

This advertisement attracted considerable attention among engineers, the plating industry, and the general public. The industry was caught flat-footed with little information to offer, despite the fact that it had been informed in 1946 and 1947 by papers read at its annual conventions by chemists of the United States Bureau of Stds.

The new, sensational improvement and economical development mentioned is "Electroless Nickel," reported by Brenner and Riddell. (*Proceedings,* American Electroplaters' Society, 1946, 1947.)

Several companies are exploiting the electroless nickel process and, when consideration is given to the necessity of purifying commercial nickel salts to operate the process properly, they may have their advantages.

As a metal-deposition process, there can be little doubt that electroless nickel is a useful addition to the plating industry, but it must be realized that the process has its limitations.

In the writer's opinion, it is not true that the process deposits to any desired thickness at a rate of 0.001 to 0.002 in. per hr.

It is not true that the coating will deposit *with complete uniformity* on any surface that can be reached by the liquid.

It is not true that an electroless deposit is less porous than an electrolytic one of the same thickness.

It is not true that the original processes and formulas developed by the Bureau of Standards were not commercially applicable and had to be developed for commercial applications.

It is not true that electroless nickel can be competitive with electroplating and can, in most cases, show substantial savings over the latter.

It is not true that electroless nickel is simpler to operate.

Claims for patented "rate boosters" that increase speed of deposition, patented stabilizers, and anti-clouding agents are misleading. All this information can be found in the papers of Brenner and Riddell.

Advantages which the process appears to have are:

Electroless nickel presents no throwing problem, as a deposit will form readily on all surfaces that the solution reaches, but metal distribution on undercuts and deep recesses will be less than that upon more accessible surfaces.

Process is particularly applicable to plating small-dia tubes that cannot be plated electrolytically.

Where buildup on critical surfaces is important, electroless nickel can be applied within limits of 0.0002 to 0.0005 in.

The deposit is brittle, but brittleness can be removed and hardness increased by heating to 750 F for 30 min.

Electroless nickel is not pure nickel. It contains at least 3% phosphorus, and may contain as much as 11%. With 3%, the deposit is less magnetic than nickel deposited from a Watt's solution; with 11% it is not ferro-magnetic at all.

RELATIVE COSTS

The sensational advertisement referred to above, and subsequent reviews in the technical literature, would lead to the belief that electrolytic plating, with its requirement of a rectifier or m-g set, a plating tank, and nickel anodes, is a costly proposition. This depends on how big the setup must be to perform the particular operation.

Electroless nickel is claimed to be inexpensive as far as equipment is concerned. Is it?

The work must be cleaned as thoroughly as for electrolytic plating. How are you going to do it? Immersion dipping in an alkali cleaner, water rinse, acid dips, if the work is small enough to dunk? Or if too big for dunking, hand-scour with pumice and alkali, flush with a water hose, pour pitchers of acid solution over it, and flush with a hose, before hoisting into the electroless tank? Not expensive? Then follow this recommendation for operating a proprietary electroless bath:

"The bath must be fed with a replenisher solution from a storage tank kept at a low temperature, passing it through a heat exchanger to raise the solution to operating temperature. A nonmetallic pump is required to feed solution into the operating tank; the overflow from the operating tank circulates through a heat exchanger to bring the temperature back to that of the storage tank. Solution then enters a rejuvenating tank where it is brought to full operating strength before passing through a nonmetallic filter and returning to the storage tank to complete the cycle."

In addition to all this, controls must be established to maintain the proper pH, and to feed the reducing agent into the solution through metering valves at the proper time intervals.

Truly, electrolytic plating is not so complicated, nor does it require so much attention!

TYPES OF ELECTROLESS SOLUTIONS

There are two types of electroless solutions: acid and alkaline. The proprietary solutions are acid, as they are claimed to be more economical from a material standpoint, and less critical to operate. Whether this is true is still a matter of opinion, depending on the type of work to be processed. General opinion is that it is more costly. The advantage, if any, seems to be in its application to large work.

In the opinion of the writer, the alkaline bath is cheaper and definitely less critical. In operating the alkaline bath, there is a definite color change at the operating pH value; there is no color change in the acid bath. In operating the acid bath, acid is produced, so the pH must be checked at short intervals with pH papers, or electronically, to keep it within the 4.5 to 5.5 range. Otherwise, maximum deposition is not maintained, and may even stop if the pH drops too low.

On the other hand, the alkaline solution is regulated to 8 to 10 pH with 1:1 ammonium hydroxide, or even, in the cold solution, with concentrated ammonium hydroxide. If the solution is clear and has the characteristic blue color of the complex nickel ammonium ion, the pH need not be checked further. If the color fades during operation, ammonium hydroxide 1:1 is added with the sodium hypophospite additions.

Furthermore, the writer prefers the deposit from the alkaline bath because it is brighter and whiter, closely resembling an electrolytic deposit. The deposit from an acid solution, even if bright, has a dark "cast" to it.

The writer does not intend to prove or disprove any of the statements made here, but leaves that to the judgment and experience of the electroplater. The accompanying bibliography is given for reference, and it is advisable to obtain literature and operating procedures from the manufacturers of proprietary electroless solutions.

Brenner and Riddell, *Proceedings AES*, 1946 and 1947

W A Wesley, "Nickel Immersion Coatings," *Plating*, July 1950

U S Patent No. 2,575, 214, 1951

"A Chemical Coating Process," *American Machinist*, Mar 30, 1953, p79.

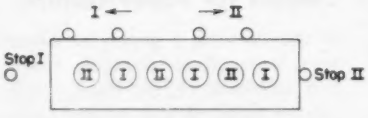
"Where Electroless Nickel Stands Today," *Materials and Methods*, May, 1953

"Electroless Plating in Production," *Product Finishing*, Jan, 1954.

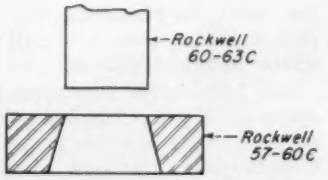
"A Chemical Plating Process," *Modern Metals*, April, 1954.

Diemaker's Kinks

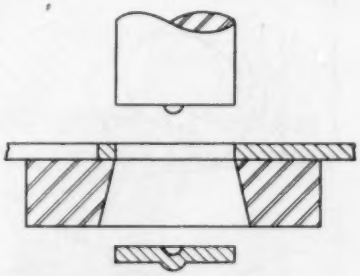
FEDERICO STRASSER



TO AVOID weakening a die plate with a closely spaced row of holes, put only every other hole in the die plate. Then with two sets of stops, one on either side of the die, it is possible to punch one group of holes, then shift or reverse the piece to punch the alternate ones.

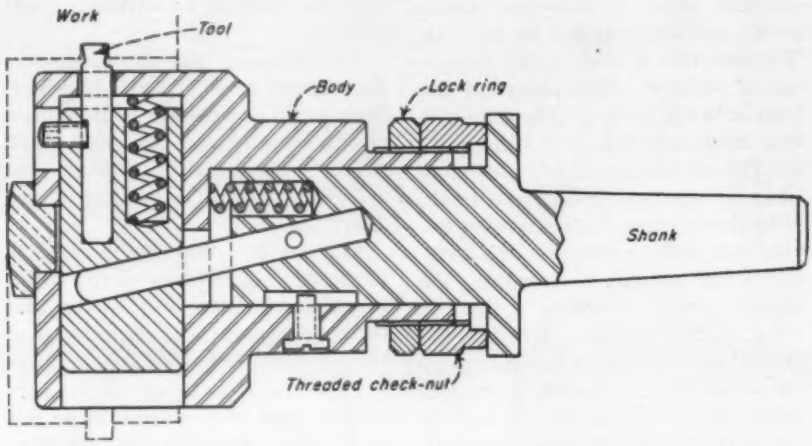


HARDNESSES of punch and die members are a matter of disagreement among die designers. From practice, it appears that the punch should be very hard (Rockwell 60-63 C) and the die somewhat softer (Rockwell 57-60 C). Tool life with this difference in hardness seems to be longer than when both members are very hard.



WHEN LUBRICATED blanks are likely to stick together, stamp a small projection in the blanks if function of the component permits. The projection punch can be made like a small pilot pin.

Practical Ideas . . .



Self-Adjusting Cutter for Internal Grooves

Internal grooves are easily cut with the tool shown here, which was designed for grooving work which has square-bottomed blind holes. The tool will hold any one of a number of different-sized cutters, and is adjustable for grooves of varying depths.

The tool consists of two main parts—a cylindrical body, and a sliding sleeve. One end of the body is tapered to fit the tailstock of a lathe, and the other end fits the inside of the sleeve. A recess in the outer end of the sleeve holds the tool and an inclined feed-rod.

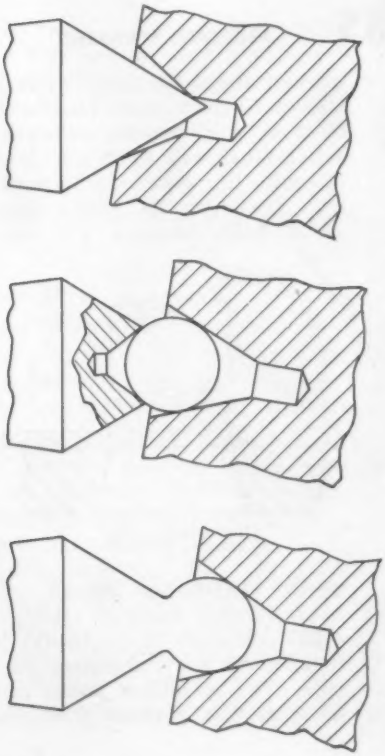
As the tool is fed into the work, the stop-plug hits the base of the blind hole, and further advancement of the tool causes the hardened feed-rod to force the tool toward the work, cutting the groove to full depth.

Maximum depth of groove is controlled by a screw in the side of the sleeve, which limits the amount of sliding movement of the sleeve.

The check-nut and locking ring on the outside of the sleeve determine the distance the sleeve may slide toward the tapered end of the tool body.

Head thickness of the stop-plug determines the location of the groove, so a number of plugs must be kept on hand, for various groove locations. These plugs are "domed" to reduce friction on the work.

In operation, the tool is simply fed into the work, advanced to cut the groove, and then withdrawn. Springs return the cutter and sleeve to their original positions. *W M Halliday, Lancashire, England*



Centers for Taper Turning

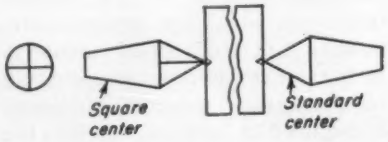
When turning a taper between centers, with offset tailstock, the standard tailstock center does not fit the center hole of the work, as shown here. This causes inaccurate work and excessive wear of both center hole and tailstock center.

For better results, hollow centers with steel balls can be used. The contact with this method is all around on a line, and the benefits are obvious.

In repetitive work, however, this method is inconvenient, because of the need for handling the extra part, so that centers with ball points should be made and used.

Ball size varies according to the diameter of the center hole, and the set of centers can be prepared to accommodate standard ranges of work.

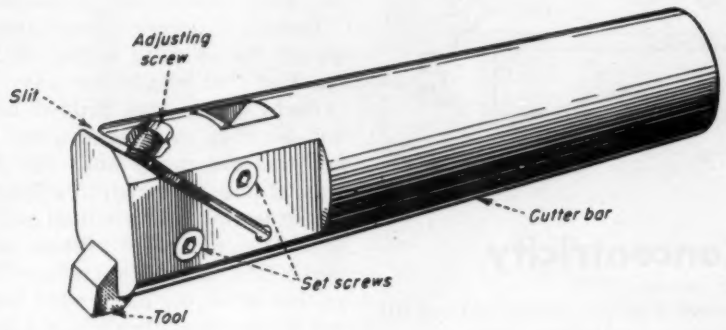
This method is especially effective with a running center equipped with ball point. *M Barash, Haifa, Israel*



Work Driving Without a Dog

In Practical Ideas (AM–Oct 25, '54) there is shown a method of driving work between centers without a dog.

Seeing this item reminded me of another way we turned several short pins, by using a hardened square headstock center (shaped like a pyramid). The idle end of the work is supported by a conventional center, while the driven end is turned by the square center, which must be made somewhat tight, to make sure there is no slipping of the work (and "stripping" of the center hole in the work). *Stanley J Wencek, Dorchester, Mass*



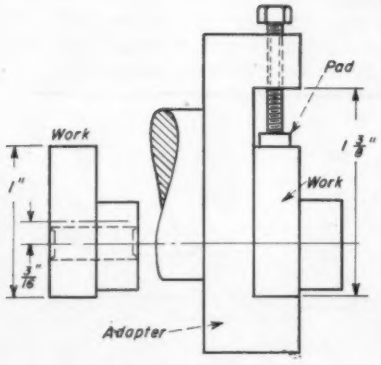
Micro-Adjustable Cutter Bar Finishes ID, OD

We have been using a micro-adjustable tool holder of the type shown, for some time, in finishing internal and external diameters to close tolerances.

The front end of the cutter bar is slit diagonally at right angles to the cutter slot, the slit ending in a drilled hole. Two socket screws hold the cutter, and a third screw pressing on the slit adjusts the size of hole or diameter as needed. In practice, the holding screw on the side of the adjusting screw is loosened, the adjusting screw turned as required, and the holding screw retightened.

If the cutter slot is midway between the drilled hole and the adjusting screw, the forward movement of the cutter point will be half the pitch of the screw for each turn of the screw. The radial movement of the cutting edge will, of course, depend on the angle of the cutter slot. A slight movement of the screw provides a very fine adjustment.

The cutter bar must, of course, be hardened to prevent damage by the adjusting screw. The cutter bar may be either shank or flanged type. *M W Lalchandani, Baroda, India*

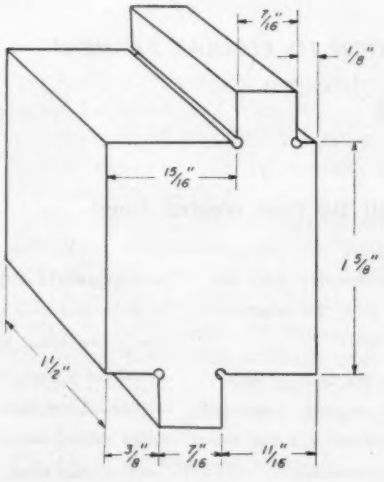


Setup to Turn Eccentric Work

One method for turning or boring eccentric work in either single piece or production quantities, is to make an adapter like that shown here. The adapter is held in the lathe chuck, bored to the required dimension, and provided with a setscrew to hold the work.

The diameter of the adapter bore is equal to the work diameter, plus twice the offset distance.

Accuracy of the finished work depends on the OD of the work and bore of the adapter. To make the adapter, rough machine the bore, remove from the chuck, drill and tap the setscrew hole, replace the chuck, and finish bore to the required dimensions. *A A Sinisi, Mount Vernon, NY*

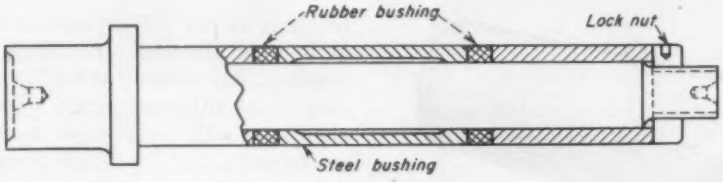


Keys Locate Work From Slots

We made a pair of keys to locate work from the slots in a jig borer table, in which the slots are 7/16-in. wide. Rather than make straight keys, we made them with 4 different widths, which helps a great deal in placing the work properly with respect to the slots. The keys are made from 1½ x 1½-in. gage stock, hardened and ground.

The 7/16-in. dimension must be ground to fit the slots, and all dimensions must be held the same on both keys. The reason for the 1⅝-in. height is to permit the work to be put on 1½-in. parallels.

Where holes must be square with an edge, it is a good idea to check the setup with an indicator. However, in most cases, the keys can be used by themselves, and will save quite a bit of time. *Richard M Outcalt, Indianapolis, Ind*



Rubber Bushings Aid Concentricity

The fixture here was used to solve a difficult grinding problem we had. The work was a bushing 9 in. long 2-in. ID, 2½-in. OD, of hardened steel. The tolerance on the OD was quite large, but OD and ID had to be concentric within 0.0001 in.

We had made a number of pieces which fell outside concentricity requirements and reworked this scrap by grinding bushings to the bottom size limit on a mandrel of the following construction.

Basic product tool was a standard mandrel with a shoulder on one end. Mild steel and rubber bushings were slipped on, and a locking nut was drawn up "finger-tight" on the opposite end. The resulting mandrel, rubber bushings and all, was ground accurately to the bottom limit of the bore of the bushings.

A bushing was slipped on, and the locknut was firmly tightened. The rubber rings expanded and gripped the bore of the bushing, causing the bushing to float on a bed of rubber, giving us very good concentricity. *Jack Schofield, Lancashire, England*

Sizing Springs

We once ordered 100 steel helical springs for a special weighing instrument. The wire diameter was 0.100 in.; OD of springs was 1.200 in., and there were 10 coils. The springs proved to be too long and the difference couldn't be taken up with instrument adjustment.

Instead of ordering new springs, we set the existing springs to the required free length this way:

Each spring was slipped on a bolt between two washers, and the nut was drawn up until the part was of the required free length. These assemblies were then put into an oven at 350C for fifteen minutes. This caused a stress-relief, so that when the parts were taken out of the oven, they did not have any springback.

However, the elastic properties weren't damaged, because the temperature stayed below the critical point.

We have since used this same method for many other problems, such as flat springs which were put into brass dies and formed accurately; and hairsprings, which we make for instruments. Even other spring materials such as brass and bronze can be similarly treated, each material having a specific temperature range which yields best results. *M Barash, Haifa, Israel*

Winner No. 218 of* $25 *IN ADDITION TO REGULAR PAYMENT

for the best PRACTICAL IDEA

IN THE DECEMBER 20, 1954 ISSUE

• **Federico Strasser,** Santiago, Chile, **'Drill Jig Cuts Wasted Time'**

An extra payment of $25 is made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

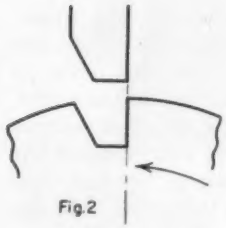
PAYMENT — $25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received — usually three to four weeks after the date of issue. The winner will also be announced in these pages as soon thereafter as practicable.

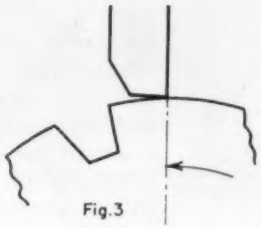
JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

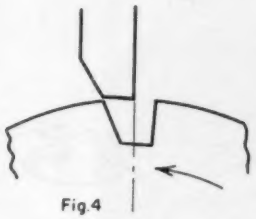
REQUIREMENTS — Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author — every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product — in terms of its usefulness to them.

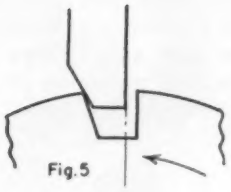
WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

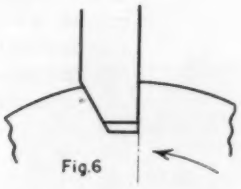
HOW TO ENTER — Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N Y

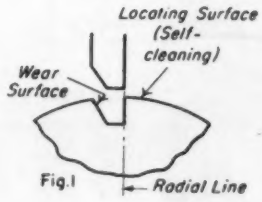












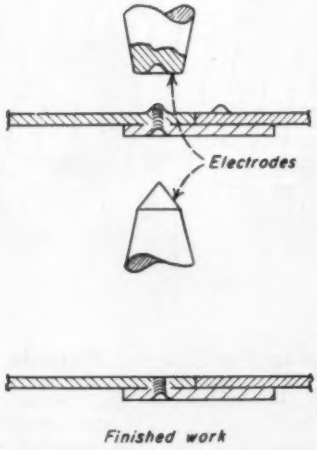
Slot for Indexing Plate Locating

In a recent Practical Idea (*AM*-Nov 22, '54, p148) the author states that "The straight side of the plunger will clean the locating side of the slot, while the inclined side will take most of the wear." There seems to be an error in what the author says. Because the straight side of the plunger and the straight side of the slot coincide, the surfaces must rub as the plunger shoots home. This is the only way the sharp edge of the plunger can "clean" the straight side of the slot. Therefore, this means wear to the locating sides of both pieces.

It is true that this kind of indexing slot is more accuarte than a "V" slot or a slot having parallel sides. However, the action of engagement is somewhat different from that portrayed in the sketch.

Various steps of engagement are shown here. When the groove has passed the plunger, the latter is forced forward by the actuating spring within or attached to it. The end rides the periphery of the index plate as illustrated, and as the next groove approaches the plunger, two taper surfaces coincide, as in the figure (left). The spring forces the plunger forward and the taper side rides down the slope of the groove, contacting at the edge of the slot to full engagement.

The author neglected to state another very important part of this construction. It is the stopping of the index plate rotation at the right time, without shock or noise, and with the correct functioning of the plunger at that time. The rotating mechanism is so designed that, as the plate groove approaches a position nearly opposite end of the plunger, rotation slows to a gradual stop. The spring forces the plunger into the groove, and the action of the taper side inches the plate ahead until the straight sides gently touch. This is the reason that the straight sides of the plunger and the groove do not wear. As the tapered surfaces wear, the plunger enters the gap further, but locating accuracy is not impaired. *Fred Rogers, Waynesboro, Penna*



Electrodes Avoid Peening Step

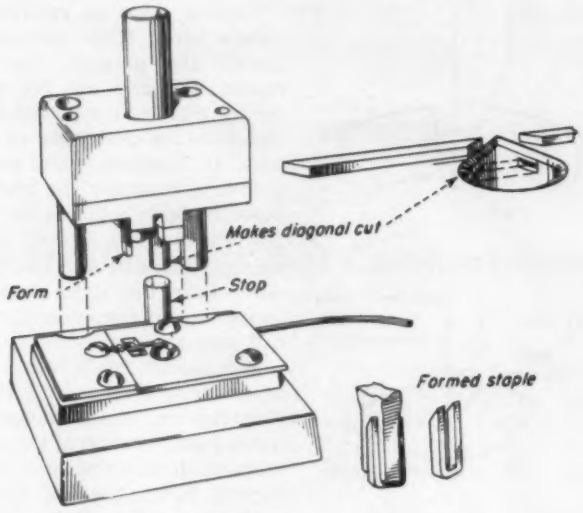
When, to obtain a better appearance on the finished part, the outside surface of a spotwelded assembly has to be without spotweld marks, the customary process is to peen the weld, to form a bulge on the outside of the work. Then the excess material can be sanded, to clean up the surface.

By changing the design of the spotweld electrodes, to the form shown here, we have eliminated the peening operation, because a bulge is formed on the outside of the work during the welding operation. Another advantage of this method is that the work does not have internal stresses set up during the previous peening method, so a stronger connection results. *George Herzl, Camden, NJ*

Tape Keeps Layout Clean

After a die block is blued and carefully laid out, strips of transparent adhesive tape ("Scotch" tape) can be placed on the layout lines. This will prevent the lines from becoming marked by chips when sawing the outline on a bandsaw.

After sawing, remove the tape, and the lines will be clean and clear, making filing easy. *James Viola, Brooklyn, NY*



Punch and Arbor Form Square Staple

We received an order for a large number of staples of the shape shown, to be made of square copper stock, formed in a U-shape, with bevelled ends. The staples were to be used for clipping military insignia onto clothing, and had to be made quickly, at low cost.

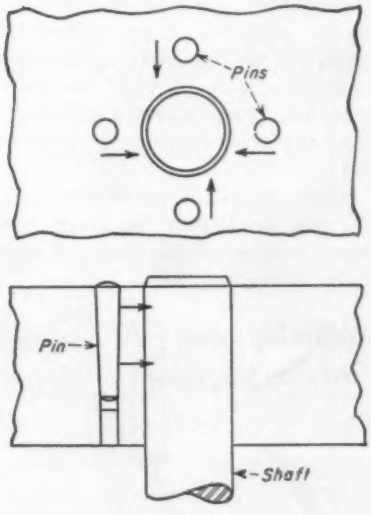
The method we used was this. We made a small die for a kick-press, designing the die so the work could be completed in one pass of the die. To do this, we made a punch which was round, but had a triangular insert on one side, shaped to cut the bevel in the staple. As the punch descended, and cut the stock, an arbor entered a slot in the die and engaged the piece of stock which had just been cut off, bending the staple to shape.

An adjustable stop on the back of the die allowed for punch and arbor wear. The stock was plain copper wire, drawn square. With this method we were able to turn out the work with a minimum of cost. *Rudolph Schmitt, St Albans, NY*

Modified File Is Useful

A useful knife-edged tool can be made from a flat file by bevel-grinding one side, leaving the other side untouched. The resulting section is triangular. If carefully done, and the ground side is stoned, a tool results which can be used as a fine-toothed saw and file.

Swiss-type files treated this way are very good when doing hairline-accuracy work. *Jesse M Heath, Kenmore, NY*

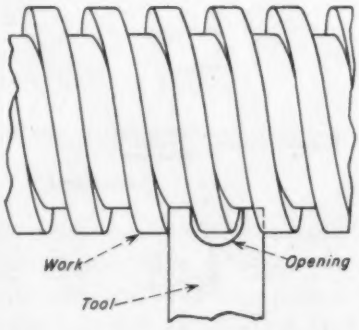


Tapered Pins Tighten Shaft

On-the-job repair of a shaft or stud, which has become loose in the hole in which it is fitted, can be done with the method shown here. One or more holes are drilled in the housing adjacent to the shaft. These holes are then taper-reamed, and taper-pins are driven tightly in place. The wedging action of the pins forces the walls of the hole against the shaft, and tightens it to any desired degree. The direction of force is indicated in the sketch.

Holes which have been worn oversize can be reduced to size by the same method, and then re-reamed to original diameter and correct circularity. The pins must be left in place permanently, and if the large end of the pin is allowed to protrude slightly, further tightening may be made in the future by driving the pin further in.

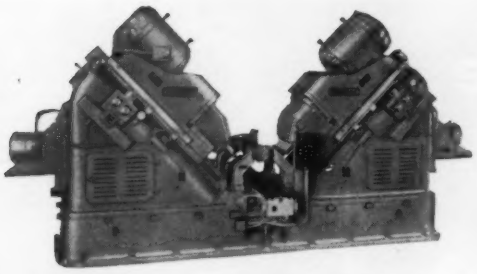
If desirable, these pins may be flattened off on two sides, concentrating the pressure in the direction of the remaining circular part of the pin. *H J Gerber, Stillwater, Okla*



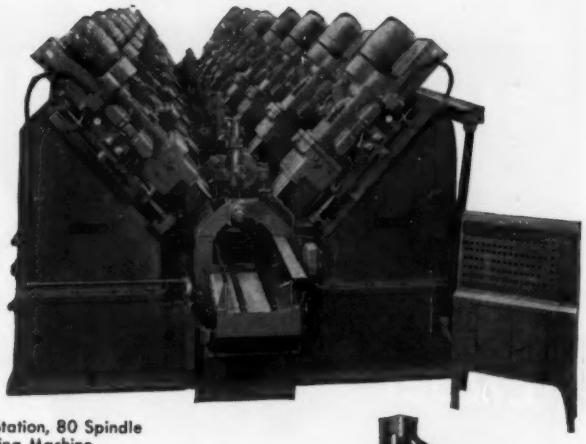
Tool to Cut Square Threads

Tool shown here is very useful in cutting square threads on valve stems and similar work. The opening between the points of the tool must be slightly larger than the finished size of thread.

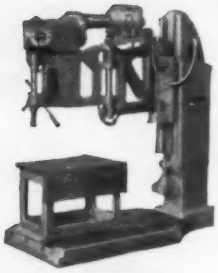
With this kind of tool, each point cuts clearance for the other, and there is less rubbing and hogging of material. *E Misener, Bay City, Mich*



Two-Way Hydraulic Feed
Vee Type Stub Boring Machine



17 Station, 80 Spindle
Drilling Machine



Unique Bracket Type Hammond
Radial Drilling and Tapping Machine

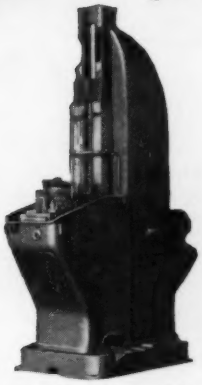
FOOTBURT

line of production machines

• Way Type Drilling, Boring, Reaming, Tapping and Milling Machines with One, Two or More Ways... Station Type Machines . . . Center Column Type Machines . . . Cylinder Boring Machines . . . Inverted Drilling Machines . . . Surface Broaching Machines . . . Sensitive Drilling Machines . . . Hammond Radial Drilling Machines . . . Manufacturing Type High Duty Drilling Machines . . . Independent Feed Drilling Machines . . . Special Machines.

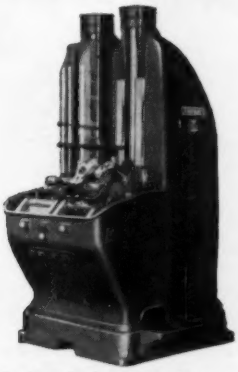
THE FOOTE-BURT COMPANY, Cleveland 8, Ohio

Detroit Office: General Motors Building

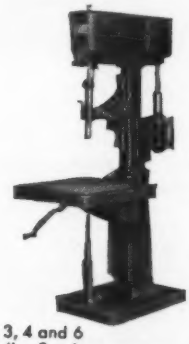


Single Slide Broaching
Machine 5, 10, 15 and 25 Ton
capacity

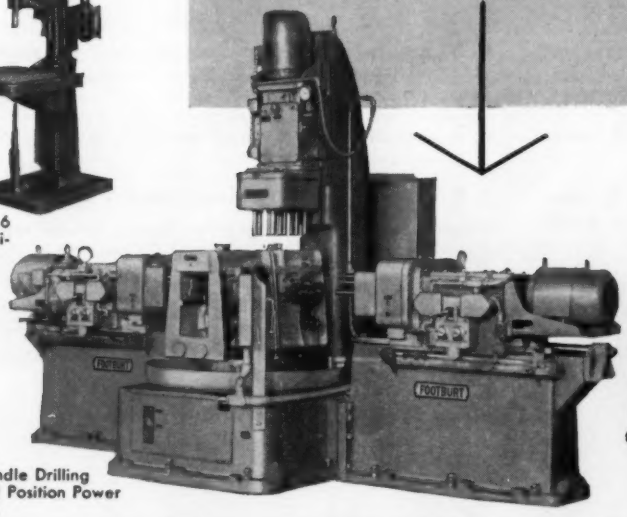
Stub Type Cylinder
Boring Machines



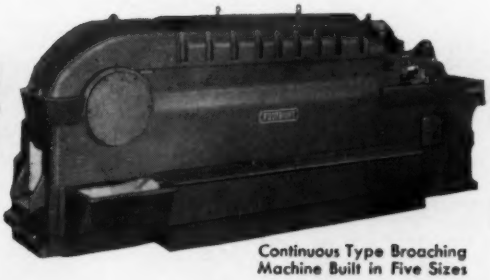
Duplex Surface Broaching
Machine 5, 10, 15 and 25 ton
capacity



1, 2, 3, 4 and 6
Spindle Sensi-
tive Drilling
Machines



3-Way 31 Spindle Drilling
Machine with 2 Position Power
Indexing Table



Continuous Type Broaching
Machine Built in Five Sizes

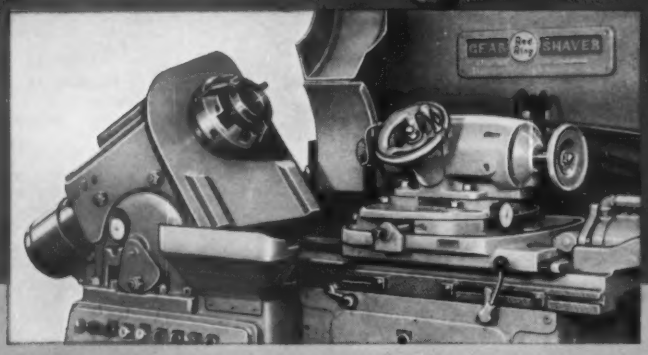
engineered for production

FOOTBURT

MACHINE TOOLS

New Machine *Shaves* INTERNAL GEARS *Faster* and to *Closer* TOLERANCES

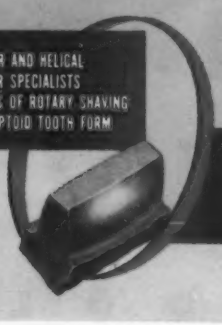
This new Red Ring Model "GCR" is a high production, high precision shaving machine for a broad range of internal gears. It provides two methods of shaving and many advantages which heretofore were available only on external gear shaving machines.



- It will precision shave all spur or helical internals 3" to 12" PD, up to 4 diametral pitch with face widths to 2½".
- It will operate on an automatic and selective feed cycle.
- It provides the opportunity to use a new, rapid PLUNGE-CUT shaving cycle in addition to conventional shaving.
- Crowning by the Plunge-cut method is optional.
- It will taper-shave gear teeth.
- It assures precision comparable to that established by Red Ring Machines for external gears.
- It reduces loading and unloading time to a minimum.
- It handles gears having integral shafts.

When using the automatic feed cycle a selected number of cutting strokes, each with its own selected increment of up-feed, can be combined with whatever idling strokes are desired. At the end of the cycle the machine automatically stops in the proper backlash position for rapid unloading.

If your manufacturing program includes internal gears, write for complete information on this new shaving machine.



NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

Z112

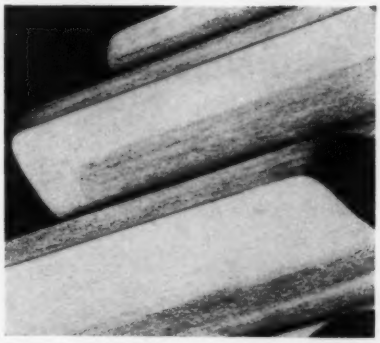
GEAR TOOTH WEAR AND FAILURE... I

Extracted from "American Standard Nomenclature of Gear Tooth Wear and Failure," (ASA B6.12—1954). Material was developed by the AGMA and published by the ASME.

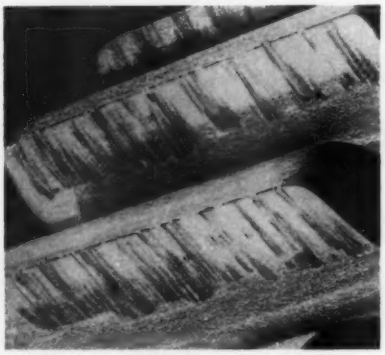
It is the purpose of this standard nomenclature to list, define and illustrate terms for the more common types of wear and failure of gear teeth. It applies only to metallic gears, the teeth of which have been produced by one or more machining operations, such as: cutting, shaving, lapping, and grinding.

Surface Deterioration

Surface changes on gear teeth may range from a mild smoothing under usual operating conditions to complete destruction of the tooth shape, resulting from causes classified as wear, plastic yielding, welding, surface fatigue and miscellaneous deterioration.



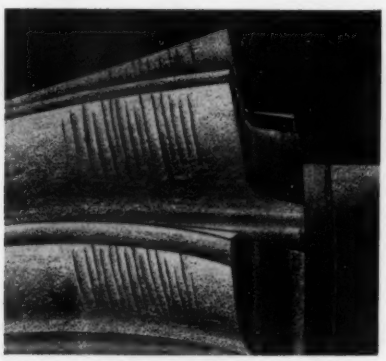
WEAR is a general term to cover sliding of metal against metal, or abrasion by lapping or scratching. Normal wear is the loss of metal from the surface of a gear tooth resulting from unavoidable abrasion, at such a rate, and to such a degree as does not prevent the gear from performing satisfactorily during its expected life.



ABRASIVE WEAR is surface injury caused by fine or fairly fine particles carried in the lubricant or embedded in the tooth surfaces. The particles may be metal detached from the gear teeth or bearings, abrasives not completely removed before assembling, sand or scale from castings, or other impurities in the oil or surrounding atmosphere.

SCRATCHING is a form of wear characterized by deep scratches in the direction of surface sliding, caused by particles that are larger in size than those associated with abrasive wear.

OVERLOAD WEAR is a form of wear that is experienced under conditions of heavy load and low speed in both hardened and unhardened gears. Metal seems to be removed progressively in thin layers or flakes, leaving surfaces that appear somewhat as if etched.



RIDGING is a particular form of scratching that may occur on case-hardened surfaces of hypoid pinions under heavy load, and showing slosely spaced grooves and ridges in the direction of surface sliding.

APPENDIX

Satisfactory performance depends upon the factors of design, manufacture and use. Design and application of gearing involve type of gear, size, load, speed, material and heat treatment. Manufacture includes quality and handling of material, and heat treatment. Quality and accuracy of workmanship affect the character of tooth contact obtained when the gears are correctly mounted.

Installation of gearing embraces design and construction of supporting parts, assembly in relative positions to secure proper tooth contact, and maintenance of such contact throughout the life of the parts.

Operating conditions include: rigidity of supports; amount and character of load; speed; kind and amount, and servicing of the lubricant; design of housing; tightness of enclosure; dissipation of heat; temperature of the surroundings.

Responsibility for performance. Each of the various agencies involved in design, manufacture and use of gears is responsible only for its portion of the work; thus, the manufacturer of the gears is not responsible for failure from improper installation or operating conditions, but is responsible for defective material and processing.

VLIER Ready-Made Spring Plungers

Eliminate Costly, Custom-Made Devices!

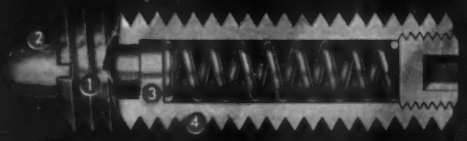
Provide accurate, pre-set end pressures for every need!

Why waste toolmaker's time machining make-shift devices to provide necessary spring loads? Standardizing on low-cost, ready-made Vlier Spring Plungers speeds jig and fixture manufacture and insures *accurate, uniform* loading, resulting in more accurate machining, fewer rejected parts!

40 TYPES AND SIZES! Hundreds of thousands of Vlier Spring Plungers are now in use positioning parts in dies, jigs, and fixtures, as detents, locating pins, and die ejectors ... wherever accurately-controlled, constant spring pressure is needed! *Order a wide assortment of types and sizes from your Vlier distributor today!*

1 Plunger end telescopes completely within body! End pressure is determined with plunger end telescoped 50%.

2 Case-hardened plunger end gives high wear resistance! Ductile core overcomes brittleness, reduces hazard of failure under impact common with hardened, high-carbon steel.

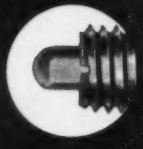


3 Large bearing surface assures perfect alignment at any part of plunger travel; eliminates binding and reduces wear!

4 Rust-proof finish prevents freezing in the fixture!

4 Nose Types Available!

Standard Nose — Cylindrical plunger end is accurately radiused to speed loading and unloading of jig or fixture. End pressures available from 3# to 42#, various diameters and lengths.



Silvernose — Cadmium-plated plunger ends identify light (1# to 7#) end pressures. Special spring design developed for fast, repetitive operations; give millions of flexes without fatigue failure!

Hexnose — Plunger end is hexagonal-shaped. Can be easily and quickly installed, adjusted, or removed with an ordinary end wrench! End pressures available from 8# to 12# in Standard type, and from 2½# to 6# in Silvernose type; various diameters and lengths.

Plastic Nose — For use with aluminum, brass, and other soft, easily marred materials. Plastic plunger end reinforced for less deformation under loading. Excellent wear resistance; high dielectric strength. End pressures available from 5# to 18# in Standard type, and 1½# to 7# in Silvernose type; various diameters and lengths.

VLIER ENGINEERING INCORPORATED

4552 BEVERLY BOULEVARD
LOS ANGELES 4, CALIFORNIA

TORQUE THUMB SCREWS • SPRING PLUNGERS • SPRING STOPS • FIXTURE KEYS • TOGGLE PADS • KEY KLIPS

Vlier Screw-ball Clamps — Overcome angular irregularities in clamping set-ups. Prevent surface damage. 17 sizes!

Vlier Key Klips— Eliminate lost hex keys! Speed positioning of part in fixture. 3 sizes!

Vlier Torque Thumb Screws—Apply accurate, controlled end pressures to the workpiece. 4 models; 19 sizes!

Vlier Spring Stops —For use where there are no wall sections in fixture. Two models: 14 and 32 lbs. end pressure.

Vlier Toggle Pads— Assure clamping of parts with irregular surfaces. 5 sizes: for use with standard screws, toggle clamps and pliers.

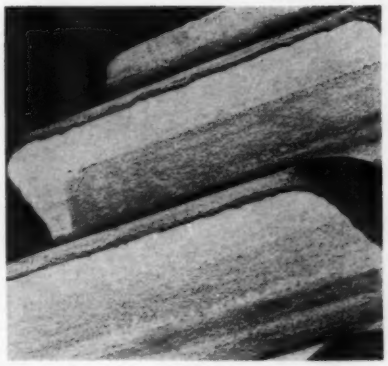
Vlier Fixture Keys —New 5-Way Key fits all common mill table slots. 3-Way model also available.

American Machinist REFERENCE BOOK SHEET

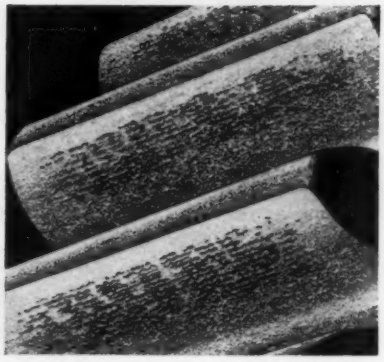
GEAR TOOTH WEAR AND FAILURE... II

Plastic Yielding . . .

. . . is a deformation of tooth surfaces resulting from heavy loads, characterized by fins on the tip edges or ends of the teeth (not to be confused with shaving fins) and an occasional ridge and matching groove on the mate at the pitch lines. It is usually associated with ductile materials, but actually occurs with hardened steel as well.



ROLLING is a form of plastic yielding resulting from heavy, even loads and sliding.
PEENING is a form of plastic yielding caused by localized impacts or by uneven heavy loads.



RIPPLING is a form of plastic yielding over areas of case-hardenend steel surfaces under heavy sliding load, characterized by a fish-scale pattern.

Welding . . .

. . . is a general kind of surface deterioration occurring when pressure, sliding and rise of temperature combine to cause the lubricating film to be forced out, allowing metallic surfaces to rub directly against each other to the extent that molecular adhesion, or welding, occurs, followed by immediate tearing apart. Welding can frequently be avoided or arrested by the use of a suitable extreme pressure lubricant.

SLIGHT SCORING is a minor impairment of the surface of a welding nature, showing slight tears and scratches in the direction of sliding, and starting at an area having a high combination of surface stress and sliding velocity generally occurring at or near the tip of the tooth. (The term *scoring* has been selected in this nomenclature, in preference to scuffing, seizing, galling).

SEVERE SCORING is a more advanced degree of welding, showing deep scratches and adhesions, and leading to rapid deterioration.

Surface Fatigue . . .

. . . is the formation of cavities in the surfaces of the teeth, usually quite small at first, and at separated areas of high compressive stress often due to surface irregularities.

INITIAL PITTING may occur when a pair of gears is first started in service, and may continue only to the stage when local high spots have been reduced, so that there is sufficient area of contact to carry the load without further impairment. This type of pitting, according to experience, is not necessarily serious.

DESTRUCTIVE PITTING is the type that continues to progress after the intial period of operation, often at an increasing rate, to the degree that remaining unpitted areas are insufficient to carry the load, and rapid destruction may occur by continued operation.

SPALLING is a more extensive type of surface fatigue in which a considerable area of surface is progressively undermined and eventually breaks out in small or large flakes. It seems to occur only in casehardened gears. Spalling may start at a crack.

Suntac Cuts Hydraulic Leakage 90%

Hydraulic ram for injection molding press leaked excessively, using ordinary hydraulic oil. Make-up ran approximately 8 gallons per week.

Leaking oil dripped on hot platen and splashed onto operator, causing burns, spotted clothing, and generally untidy condition around the press.

Packings required changing at least once a month—frequent adjusting. Down time for maintenance seriously reduced productivity.

Changed to SUNTAC. Make-up oil now running only about ½ gallon per week. Operators are happier, and productivity greatly increased.

If you have a leaky hydraulic system, remember this: SUNTAC is the hydraulic oil especially compounded to reduce leakage. Special additives make the droplets cling together . . . keep them from leaking through packings. Experience has proved that SUNTAC will cut leakage an average of 35%. Get complete information about SUNTAC Hydraulic Oil from your Sun Oil Co. representative. Or write Dept. AM-3.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

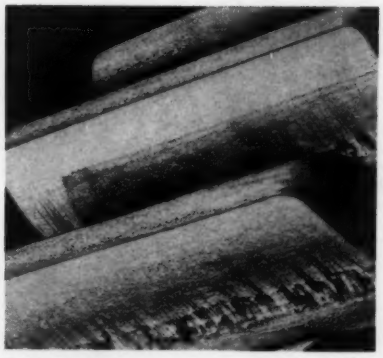
Refiners of famous High-Test Blue Sunoco Gasoline

American Machinist REFERENCE BOOK SHEET

GEAR TOOTH WEAR AND FAILURE... III

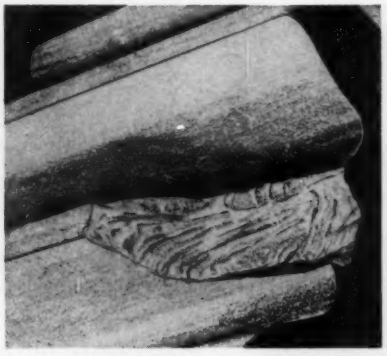
CORROSIVE WEAR is the result of chemical action on metal tooth surfaces by improper kinds of lubricants, by either acid or alkaline contamination, or by oxidization, the effect of which may be accelerated by excessive moisture in gear cases.

BURNING is a discoloration and loss of hardness resulting from high temperature produced by excessive friction, caused by overload, overspeed, lack of backlash, or faulty lubrication.

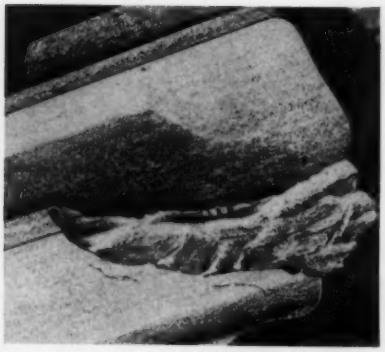


INTERFERENCE is a type of failure arising from extremely heavy tooth contact on a limited area, caused by improper tooth action, such as excessive heavy contact between the tip edge of one tooth and the fillet surface of a mating tooth, and which may cause localized abrasion or gouging. Such a condition may be the result of improper design or manufacture, or assembling the gears at too close a center distance for the profile shapes existing on the teeth, or deflection.

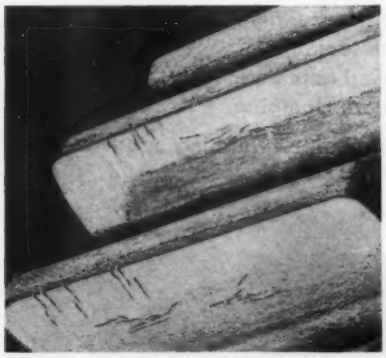
GRINDING CHECKS are fine cracks usually in a definite pattern, caused by improper grinding technique, or improper heat treatment, or both. They are usually not visible until the gears are placed in service.



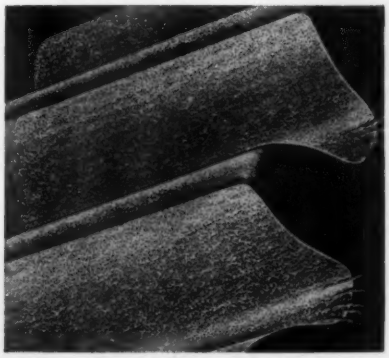
OVERLOAD BREAKAGE refers to gear-tooth breakage as the direct result of an unexpected shock overload, such as may be caused by jamming of other connected machinery, and of a nature not attributable to improper design, application, or faulty manufacture of the gears.



FATIGUE BREAKAGE results from a large number of repetitions of a load (revolutions or cycles), rather than being caused by a single application of a shock load. A fatigue break is of a progressive nature, starting as a short crack which continues to extend until a portion, or a whole tooth, breaks loose. Discoloration and rubbing apparent on the fractured surfaces, if discernible, are indications of fatigue breakage. Sometimes fatigue fractures are characterized by a series of "contour" lines roughly concentric and spreading from a focal point. This area has a smoother appearance than the surface of the final fracture.



CRACKING results for residual stresses induced in hardenable material by faulty manufacturing control, or from improper operating conditions. One cause is too soft a core, or some other form of improper heat treatment. Chipping and flaking represent various forms or degrees of cracking failures in which portions of teeth break out.



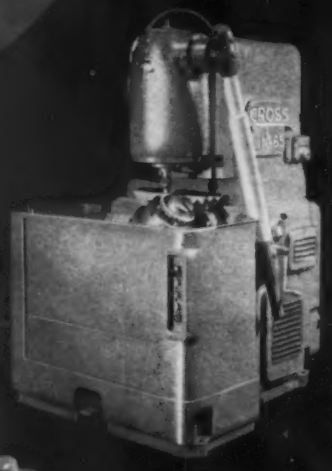
QUENCHING CRACKS result from improper heat treatment, or from extremely sharp fillets or tool marks. They usually start at the roots or ends of the teeth. Deliberate fracturing of such a tooth will show a dark area where the crack existed.

Greater Flexibility with Cross Gear Machines

for rounding • chamfering • pointing • burring

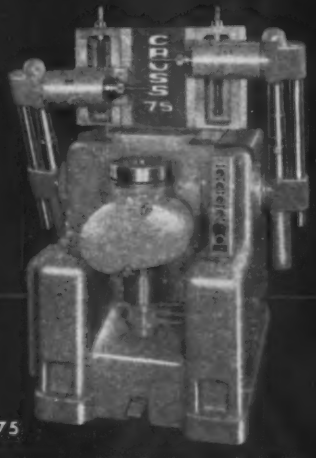
NO. 55

For rounding, pointing, chamfering or burring external and internal—
spur gears • helical gears
clutches • splines
Typical production—rounding or pointing 8 pitch 30 tooth gears—55 net hourly.



NO. 65

For pointing or chamfering external and internal—
clutches • spur gears
bevel gears • splines
Typical production—pointing 10 pitch 30 tooth gears—100 net hourly.



NO. 75

For burring or chamfering both ends at the same time—
helical gears • spiral bevel pinions
hypoid pinions
Typical production—chamfering 8 pitch 40 tooth gears—200 net hourly.

- ★ **Flexibility for handling a wide variety of gears.**
- ★ **Rugged, heavy duty construction for continuous high production or job shop operation.**
- ★ **Short setup time (as little as 15 minutes) for changing from one gear to another.**
- ★ **Simple, inexpensive tooling.**
- ★ **Push button controlled automatic cycle.**
- ★ **Hydraulic power work clamping.**

For mass production or short run jobbing operations, there is a Cross Gear Machine to suit your requirements.

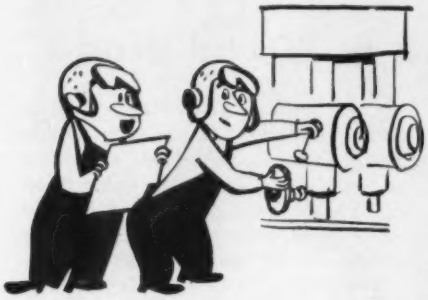
Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

Talking Shop . . .



Airline Schedule in Shop

AIRLINE operating techniques have been adapted to Metalworking; they make a lot of sense. Every airline has pilot-copilot check sheets to insure proper plane check, takeoff, and landing procedures. One big Midwestern metalworking plant is reportedly using a magnetic-tape playback unit with a looped tape to sound off with a check list for the setup man for checking out setups on a fairly complicated multistation production machine. This assures sequential checking of various control and cycle elements, avoids wrecking the machine if cycling is not done properly.

Ceramic Evaluation

ABRASIVE JETS have been adapted at the Bureau of Standards to test abrasion resistance of ceramic coatings. The job was done for Bureau of Aeronautics, US Navy, which is working on scuff-resistant coatings for aircraft. The jet is faster than earlier methods, can simulate all kinds of service conditions, check any coating regardless of gloss, color, thickness, or area. The jet is of CO_2 gas, at 40 psi, propelling abrasive powder from a vibrating storage chamber. "Angle of attack" can be set from 20 to 90°, and the test piece moved in any direction with relation to the jet. The unit will work where qualitative means will not.

Dechipping Station

AUSTIN MOTOR CO, LTD, Great Britain, makes its own transfer machines with unit heads, standard bases, etc. After some study, it was decided to standardize on the platen-transfer type, because it was found that if platens were not required the same machine could be used without 'em. A second interesting decision had to do with removal of "swarf"—chips, to you. One way is to pass the platen, fixture and work-piece into a special compartment where the platen is revolved 360° horizontally while jets of air are directed at it. Blown chips fall down into a conveyor.

Sprayed Belt Lives Longer

OIL SPRAY is being tried for reconditioning abrasive belts, with startling results. Intermittent spray from an aerosol bomb or a paint-spray head "opens up" old belts and lengthens useful life. Some old belts have been retrieved from scrap and put back to work for 50% longer. For steel or other ferrous metals, the spray contains colloidal sulfur; for nonferrous metals, sulfur-free oils are used. The spray seems to be no help to new belts, and does not eliminate the "grease stick." . . . Two special belt grinders are going into one Midwestern plant to descale large steel sheets, eliminating pickling. Tests indicate a cleaner, cheaper job results.

Tick, Tick, Tick

THERE IS a machine built which none can beat at the game of noughts and crosses (our tic tac toe), according to our London compatriot, *The Machinist*, for Jan 14, '54. Reminds us of the dog who could play chess. Anyway, this machine can save endless time for school children who now play. To save *man*hours, the machine will have to learn poker or crapshooting.

English Transfer

AUSTIN MOTOR CO, LTD, in England, reports that material wastage on auto parts amounts to a little less than a ton in each two for forgings, about a ton in two for castings, and about a ton in three for parts machined from bar. Shell molding, squeeze forging and cold heading (to replace heavy cuts on automatics) are cutting these wastages somewhat. The company has also installed 60 straight-line transfer machines and 43 rotary-indexing units, each built from standard units. Such units include a power head* that can mill, drill, or bore, and the use of platens or shuttles so small or irregular parts can be handled. For a cylinder block, a transfer machine cost £25,-903 against £30,850 for equivalent separate tools, and took only 390 sq ft against 500 for separate tools. Horsepower was less; operating cost less. The transfer unit turns out 20% more, with only two operators, costs over-all £123 less per 40-hr week . . . A gearbox line has 10 machines with 10 operators, as compared with 45 machines and 37 operators the old way.

*To produce the standard heads, Austin was forced to set up its own shop at a cost of £60,000. This shop has thus far turned out 2150 heads in 4 sizes, each of two stroke lengths except the largest.

Save the Top

MORE AND MORE companies are finding it pays to keep tabs on the health of their executives—one of the top assets of any firm. The idea of keeping the bosses in good shape has mushroomed since World War II, when a lot of companies found that wartime strain was beginning to tell on their key men, and that something had to be done about it. Recently, the National Industrial Conference Board quizzed 120 firms that have executive health programs. NICB found: (1) 69% started their programs since the end of World War II, (2) 75% make their periodic examinations on a voluntary basis and 90% of their executives are glad to cooperate, (3) 62 out of the 120 companies employ outside examining agencies, with about 40% preferring clinics or hospitals to private doctors, (4) of the remaining 58 firms, about half give the executive the option of being examined by the company doctor or an outside agency, (5) out of 102 firms, 88% extend coverage to middle management, 50% to first-line supervisors, and 46% to non-supervisors such as lawyers, chemists, engineers and editors, and (6) doctors and employers agree that the company should be informed if an executive is found to have a physical defect that could somehow injure himself, the company, or both.

News of Metalworking . . .

CUTBACK IN MILITARY SUPPLIERS:

10,000 Firms to be Axed as "Dead Wood"

They include those that have merged, switched lines or failed—plus some that have simply lost touch with today's needs

WASHINGTON—The Defense Dept will soon slash some 10,000 firms from its *Register of Planned Wartime Material Suppliers.* That's the master list of 340,000 plants—mainly metalworking of one type or another lined up to produce top-priority military goods under full mobilization.

The firms that will be cut out are described by Pentagon officials as "dead wood"—companies that have merged, gone out of business, changed product lines. But also included will be many firms which just haven't kept in touch with the industrial mobilization program.

The *Register* is an important listing for those who want current military business and those who want to sell to the military in the future. To make sure your firm stays on the roster, check with the "Armed Services Procurement Planning Officer" to whom your plant is assigned.

Here are some tips from Pentagon industrial mobilization officials on what to do if your firm is on the supplier register:

• Keep your plant surveys up to date in your ASPPO's files. Check on renewals of your tentative production schedules—the so-called "phantom orders." They expire from time to time. Bring your facilities to the attention of other military services. You can do business and plan mobilization production outside your ASPPO's own branch of service.

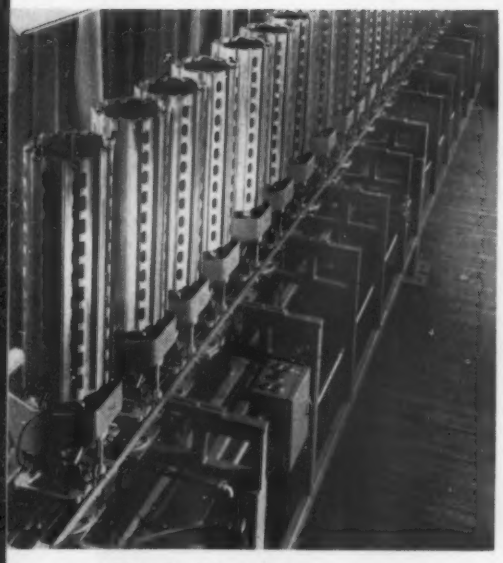
Officials say one thing hasn't been widely played up about the supplier register: you can get on it even if you don't make any of the 970 blue-chip military end-items on the inter-service *Preferential Planning List.*

The three services have planning lists of their own—totalling at least 5000 additional items—for which mobilization production schedules and specific suppliers are being lined up. These firms are placed on the supplier register and come into the Mobilization Planning Program.

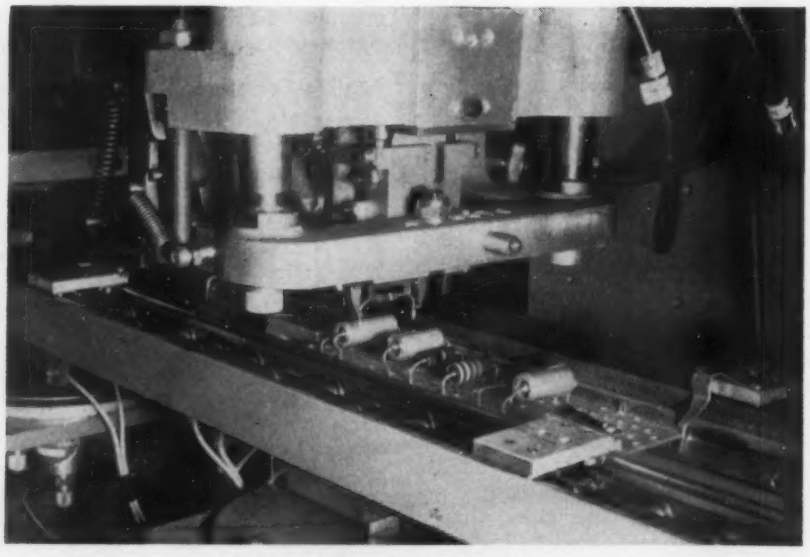
The *Preferential Planning List* is the list that figured in Defense Secretary Wilson's recent switch in arms buying policy. The policy change put new emphasis on multiple sources of military supply, said contracts can be let to higher bidders when this helps maintain a broader mobilization base. It affects only the 970 military items on the list.

In recent weeks, the services have issued new procurement regulations to put into effect Wilson's new policy. It's still too early, however, to say how much it will affect military contract awards. So far, only one proposed contract—from the Army—involving award to a high bidder as a means to maintain the mobilization base, has been submitted for Washington approval.

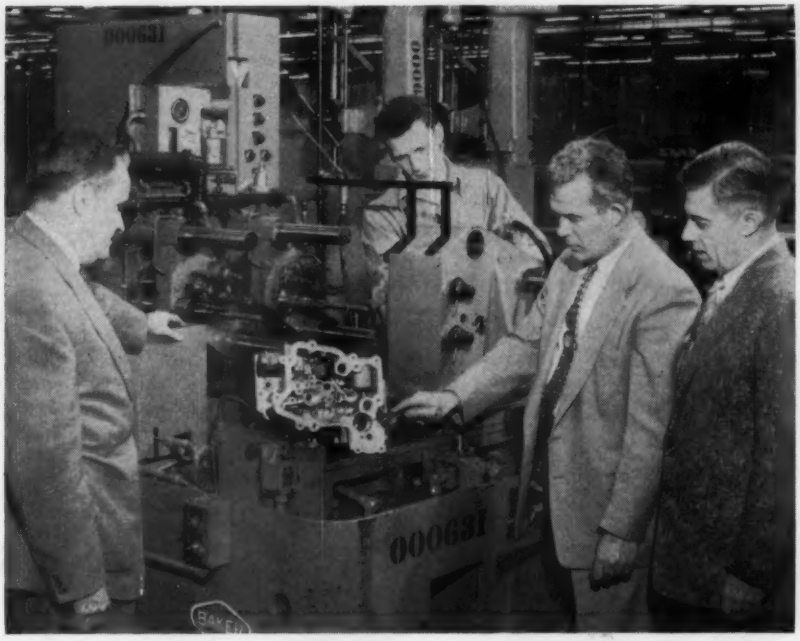
Machine Assembles 20 Multi-Part



This is "Autofab" . . .
GENERAL MILLS' automatic assembly machine can insert from 1 to 24 components into printed circuits



a machine that makes 20 assemblies a minute . . .
PARTIALLY ASSEMBLED PLASTIC PRINTED CIRCUIT CARD is shown about to receive the resistor. Wrap-around sleeves on leads, which give off-the-board mounting, were developed by IBM, buyer of the first Autofab



Multi-Spindle Machines Cut Jet Engine Control Manufacturing Costs 90%

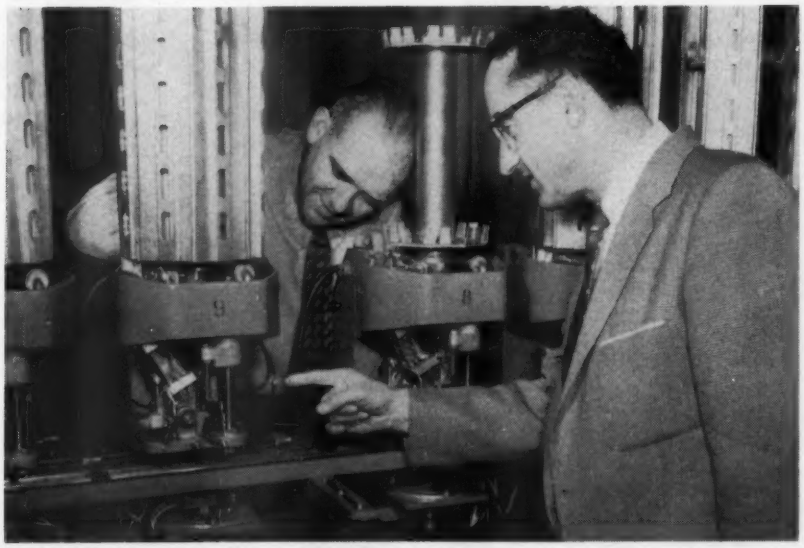
A BATTERY OF SPECIALLY-DESIGNED MULTIPLE-SPINDLE DRILLING MACHINES, recently installed at United Aircraft Corp's Hamilton Standard Division, Windsor Locks, Conn, in place of smaller drill presses, is reported to have cut drilling costs on housings for fuel controls about 90% and can be accomplished nine times faster than before. The machines drill 110 holes in 17 operations. The holes vary in diameter from ¼ to 2¼ in.

AUTOMATION:

CHICAGO—Six economic and social trends already under way in the United States today will get a decided boost from automation. That's the opinion of economists at the Council for Technological Advancement, Chicago affiliate of the Machinery & Allied Products Institute. Here are CTA's estimates of the effects of automation on U S society and economy:

- Living standards will continue to rise as productivity increases with the introduction of automatic process and other technical improvements.
- Jobs will increase as markets expand with higher living standards.
- Job opportunities for women will increase because less physical strength will be required.
- Youth both requires and will be able to get more education as jobs become more technical and as living standards rise.
- The historic trend toward concentration of population in large urban centers will slow up or come to a halt as new plants, constructed to take advantage of automation, are built away from congested centers.
- The proportion of the population engaged in trade, service and manufacturing will rise and agriculture and mining will decline.

Electronic Units in One Minute



. . . and the men who created it

AUTOMATION EXPERTS WHO INVENTED AUTOFAB are (foreground) Dr Cledo Brunetti of General Mills Mechanical Division's Research and Development, and Chief ERD engineer Thomas R James, food machine designer

FIRST ONE SOLD TO IBM BY GENERAL MILLS

MINNEAPOLIS — A fully automatic machine that assembles as many multi-component electronic assemblies in a minute as the average worker can in a day by ordinary methods, has been developed here by General Mills Inc's Mechanical Division. "Autofab" requires only two workmen and a supervisor to produce upwards of 200,000 assemblies a month, based on a 40-hour-week operation. The first Autofab has been sold to International Business Machines Corp to produce huge electronic computers for the Air Force. Autofab, according to one General Mills official, "is the forerunner of machines that will one day produce completely assembled chassis for radios, television sets and similar electronic systems."

Pistons are selectively assembled . . .

CHEVROLET ENGINES: New Flint Plant's

Transfer machines, electronic balancers, automatic inspection, other equipment arriving — 15 carloads per week — for four 1100-ft automated block lines, six head lines, two assembly lines

FLINT—"Segmented" automation is one of the features of the new Van Slyke Road plant where Chevrolet is producing their new V-8 engine. Segmentation allows for intervals or spaces between transfer machines where banks of engine blocks or cylinder heads are maintained, the parts having been completely machined up to the point where they are located.

Handy Stockpiles

If a machine in the line behind this stockpile is down for any reason, the banks can be drawn upon to keep the line operating from that point on. Meanwhile, that part of the line leading up to the down machine can be operated to stockpile more partially finished blocks or heads.

Multiple Lines for Safety

One complete block line and two cylinder-head lines are now in full operation while three additional block lines and four head lines are being installed. Multiple lines permit continuous production despite partial shut-downs.

U-Shaped Lines

Block lines are U-shaped with each leg running over 560 feet in length so that the work progresses along one leg, across the bottom of the "U" by means of an up-and-over conveyor and then along the other leg to the starting point.

Machining Engine Blocks

Broaching top and bottom faces in a Cincinnati machine starts the machining of these 190-lb castings after which they automatically move through 320 feet of transfer machines in the first leg of a line. Nine of these machines have a total of 122 stations with more than 550 spindles. In this leg, finish-bored cylinder bores are honed, air-gaged, and marked. The block then moves to a Centri-Spray machine which thoroughly flushes it by means of high - pressure streams directed through nozzles as it is turned. Plugs are inserted mechanically in holes and the jacket is air tested for leaks.

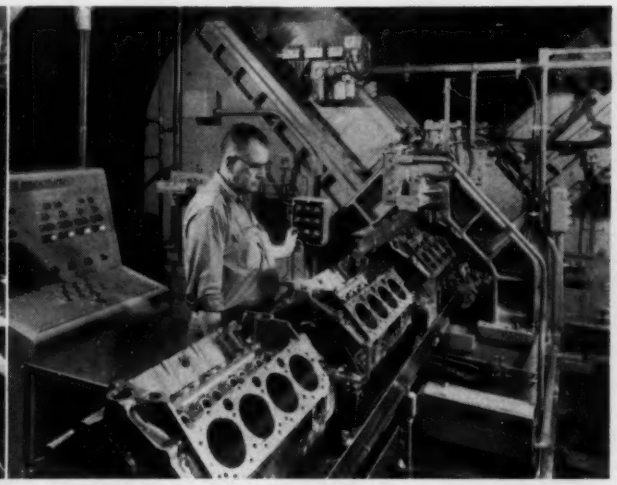
Installation of main bearing caps follows an automatic inspection to insure proper clearance for milling cutters after which both crank and cam holes are line-bored and finished. Bank faces are finish broached, after which blocks are washed, dried after all chips are flushed away.

Cylinder-Head Lines

Somewhat shorter lines are employed for cylinder-head production. After broaching faces and bosses, a 20-station Foote-Burt transfer machine drills, reams, counterbores, and spot-faces all holes except those for valve stems. A total of 157 spindles are contained in this machine which also inspects the holes for depth and, of course, dumps chips. A second Foote-Burt machine having 108 spindles in 22 stations is directly connected to the first and roughs and finishes the valve holes, mills valve spring seats, and taps all screw holes. Chips are dumped three times in this setup and the blocks are repositioned, or turned, four times. Heads are then

Room for changes . . .

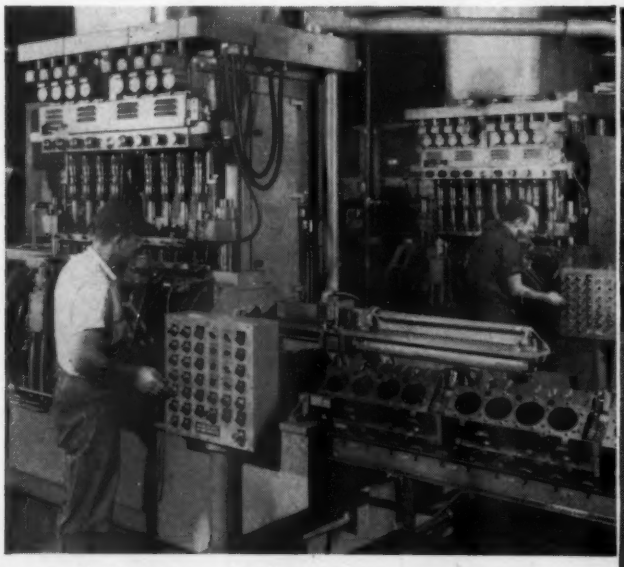
PROVISION FOR POSSIBLE FUTURE NEEDS is these 7 idle stations in 25-station W F and John Barnes transfer machine. 129 spindles drill and chamfer all holes at the front end of block, ream oil gallery holes, and rough ream front cover and clutch housing. Gallery holes are checked for leaks with 70-lb air pressure at the 24th station, 25th unloads



Light cuts . . .

CYLINDER BORES are semi- and finish-bored in banks of 4 in 6-station Sundstrand with 16 spindles. Two blocks are loaded, pan rail down, at the 1st station. First block in the pair is bored at stations 2 and 3 while the second is handled at stations 4 and 5. Unloading is at 6. Light cuts permit four bores without overheating

"Segmented" Automation Aims for 180 / hr



Hones V-8 block vertically . . .

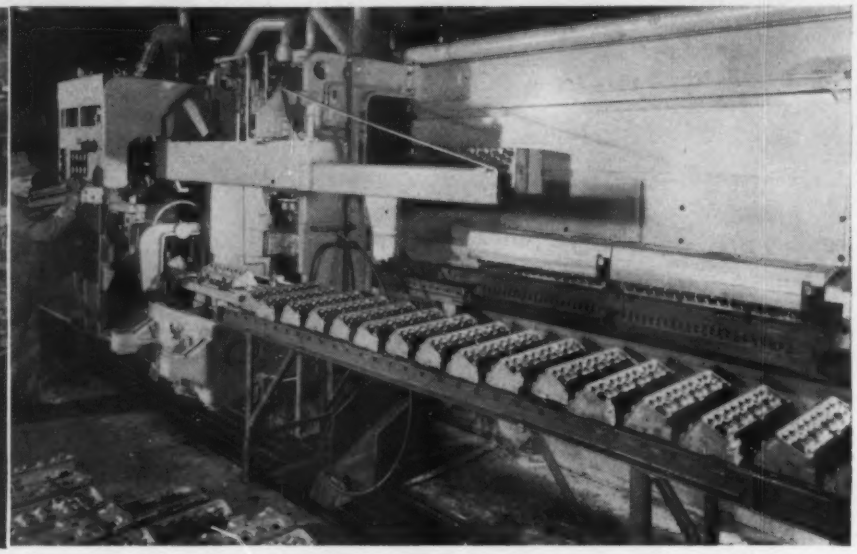
CYLINDER BORES ARE HONED AUTOMATICALLY in this Micromatic Hone setup where vertical spindles rather than angular heads are used to save floor space, eliminate possibility of deflection in heavy spindles. Two blocks enter the machine at once—one is tilted to present first bank to a set of four spindles while the other is tilted in the opposite direction to present the other bank. In this 4-station machine, on the second leg of the "U," loading and unloading is in the 1st and 4th stations while 2nd and 3rd hone the bores

Eight bores at once . . .

AUTOMATIC INSPECTION AND MARKING of cylinder bores is done eight at a time in Sheffield machine. Floats in columns indicate exact bore size, held within 0.0002-in. Manual dials are then set to stamp sizes on pan-rail side for selective assembly

For smooth operation . . .

DYNAMIC BALANCING within ½ oz-in. follows assembly of reciprocating parts such as the pistons, flywheel, timing sprocket, and crankshaft. Special machines built by GM Research show location and degree of unbalance on dials so that W F and John Barnes drillheads can remove stock from crankshaft counterweights at front and rear. About 3 to 5 oz-in. of unbalance is deliberately built into the crankshaft to control its location and thus facilitate final balancing here. Engines are run at 700 rpm to show out-of-balance, then stopped while operator sets controls at the point indicated to actuate the drills first at one end, then the other. Depth of drill entry, however, is automatic, being governed by the measurement taken by the balancer



no lost motion in broaching . . .

CYLINDER HEADS ARE BROACHED in this 3-station Cincinnati machine at the beginning of the head line. Here contacting and manifold faces, locating notches, and height bosses are machined successively, being loaded and unloaded automatically at one station after another. Timing is precise and permits no lost motion — while one station is unloading or loading, another is in operation

CHEVROLET ENGINES (continued)

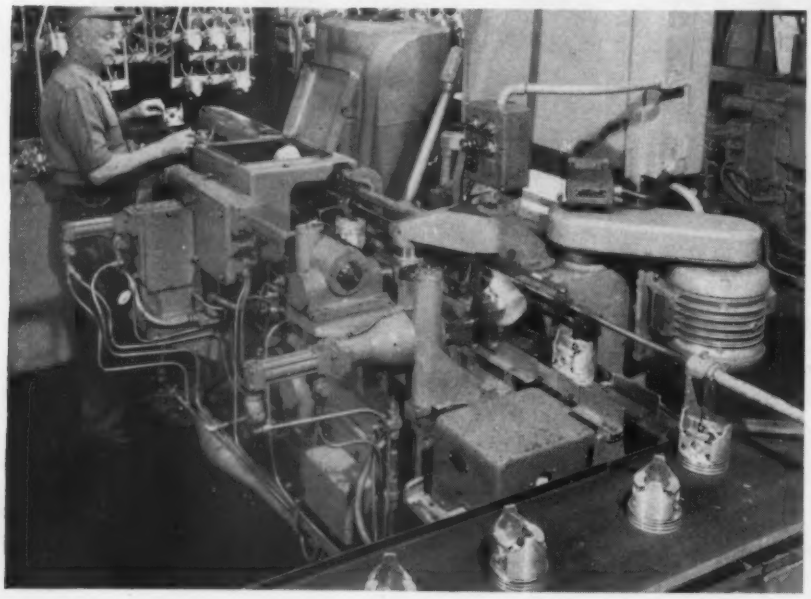
washed and dried, followed by air gaging the holes and seats.

Assembly and Balancing

Next operation is installation of stud bolts for the rocker arm, press-fitted at 1700 psi, and assembly of valves and springs to heads after which they are conveyed to engine assembly line. Extending across the rear of the plant for 600 feet, this line follows a conventional pattern where machined blocks are loaded on fixtures or "saddles" that carry them through the fitting of piston, connecting rod, and other previously prepared assemblies.

At this point an ingenious Jervis B Webb conveyor system is employed to carry the engine with all reciprocating parts, installed, to a battery of dynamic balancing machines (see upper left). Electronically controlled carriers pick up engines but do not move until space ahead is vacated.

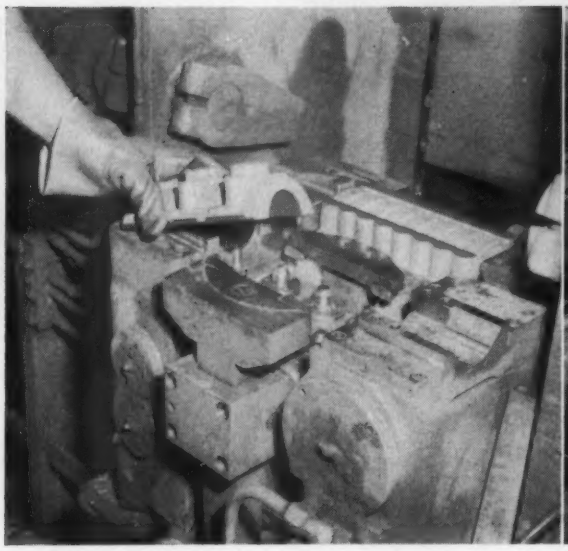
After balancing, controls on carrier send the engine to assembly line or to an overhead storage line. Returned to assembly line, engines receive cylinder-head sub-assemblies and other components, until completed. They are then tested under their own power while inspectors check for water leaks, oil flow, or any defects. Final step is painting.



Weight automatically . . .

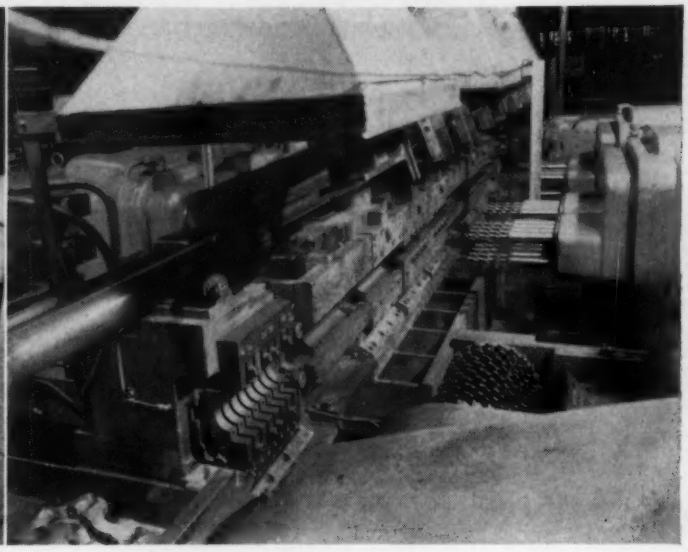
←

PISTON SPECIFICATIONS ARE MET by this automatic Morris weight mill which weighs them, sets a cutter to remove whatever stock is necessary to bring them into tolerance, and then weighs them again as a check. Work is turned over automatically after passing the first scale, then transferred to a fixture where it is located and clamped for milling. A second turnover fixture re-positions it for transfer out of the machine onto a belt conveyor before it reaches the second scale



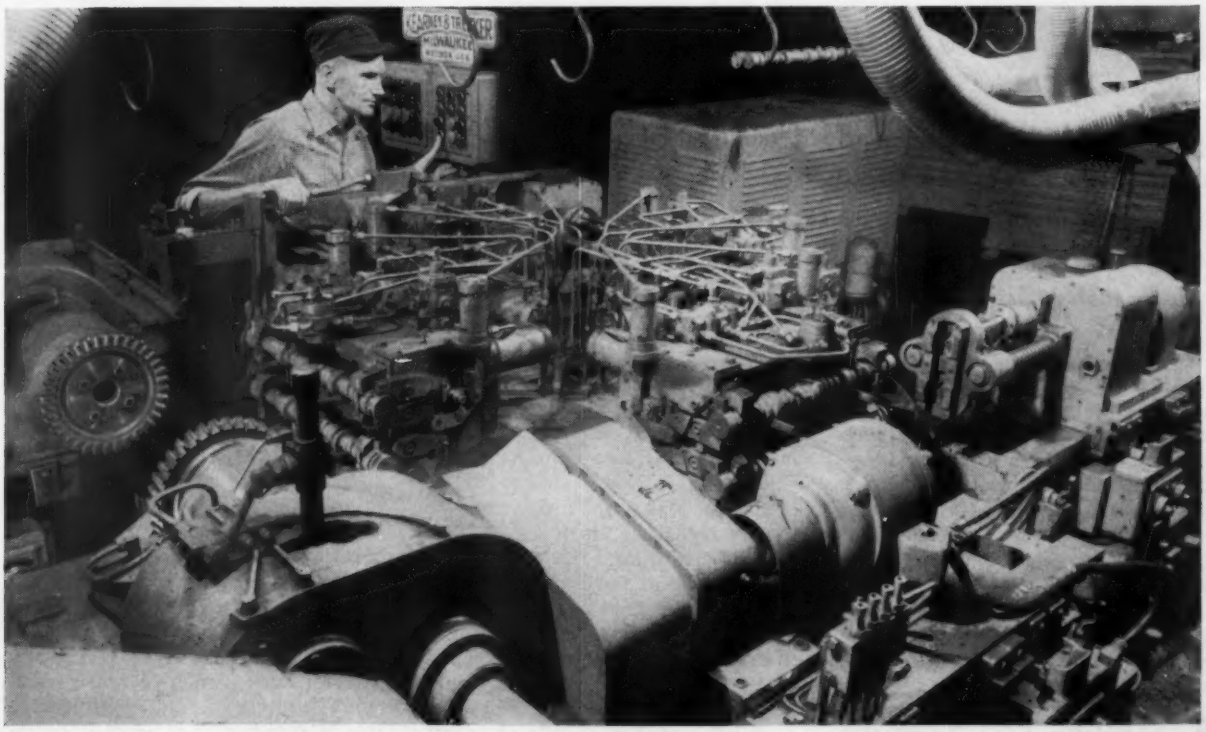
Bearing caps en bloc . . .

TOOL AND PRODUCT DESIGN were combined to permit machining main and intermediate bearing caps together. Fixtures in this machine hold one cluster of each type for machining contact faces, bringing both parts to the same height



Machined and separated . . .

GANG MILLING CUTTERS in 15-station, 51-spindle, Cross transfer machine part intermediate bearing-cap blocks, or clusters, into separate caps—8 from each block. Preceding operations included drilling, reaming, chamfering, and others. Three idle stations provide room for future changes or added operations



Camshafts milled to length . . .

FOUR-STATION ROTARY indexing setup is first step in machining camshaft. This Kearney & Trecker machine mills shafts to length, drills and centers them after loading in first station. After machining in three working stations, parts are manually removed from the machine when they return to the starting position

News of Metalworking . . .

ASME Honors *American Machinist* as Its "Founding Father"

BORN IN OUR OFFICES 75 YEARS AGO, the American Society of Mechanical Engineers presented a bronze plaque (left) "Commemorating the Founding Meeting of the Americal Society of Mechanical Engineers in the Offices of *American Machinist* on February 16, 1880." The plaque was presented on Wednesday, February 16 at the opening session of ASME's 75th anniversary meeting, held in the dining hall of the McGraw-Hill building. ASME President David W R Morgan (left) made the presentation to Donald C McGraw (right), president of McGraw-Hill, and Albert Hauptli, (center) publisher of *American Machinist,* a McGraw-Hill publication. The American Society of Mechanical Engineers today has grown to a 40,000-member organization

SECURITY RISKS:

At Long Last, Washington's Doing Something About Them

After years of shilly-shallying and tying up industrial security measures in a maze of red tape, Washington has set up a Central Screening Board for suspected subversives. Now, if you have a suspect, the Pentagon will check his background for you and give you a fast decision on whether suspension is justified

WASHINGTON—The Defense Dept has overhauled its security clearance system for employees of metalworking and other defense plants. Idea is to reduce the number of unnecessary suspensions and speed-up clearance of industrial workers whose jobs require access to secret government matter.

Washington will have direct control under the new program. Plant security officers will make an initial check on employees in the plant, then refer cases that look risky to a "Central Screening Board" that's being set up in the Pentagon. The Board will make a further investigation to determine whether a suspension is justified.

If a suspended man wants to contest the decision, he will get a hearing before one of three regional hearing boards, located in New York, Chicago, and San Francisco. If this board makes a split decision — or if a "novel issue" is involved — the case goes to a new "Central Review Board," also at the Pentagon, which will have the final say.

Under the old system, Washington didn't figure in this at all, except to set up the ground rules. The regional boards were divided into screening and hearing boards, doing pretty much what the two new Washington boards will do now. The trouble was that the regional boards ran along independently of each other with little or no central guidance and control.

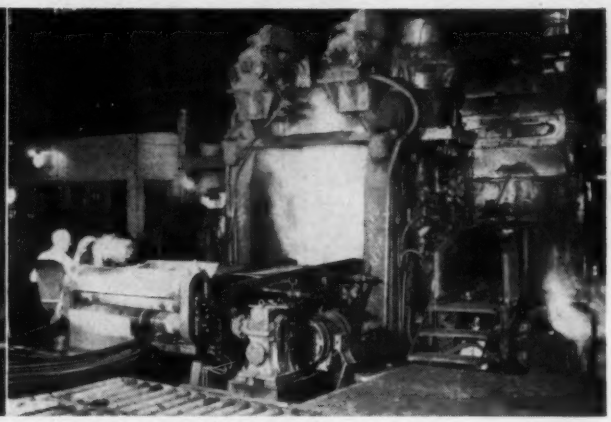
Revamping of the Security Clearance Program is designed to answer labor criticism that the number of suspensions is excessive and that the amount of time required for clearance is too lengthy.

But the unions' main complaints are unanswered in the new regulations: that the criteria for declaring someone a security risk are too vague, and that workers accused of being security risks cannot confront their accusers. Actually, these rules are outside Defense Dept control and are handed down from the White House.

Also unanswered is a management question: what to do with an employee declared a security risk and denied access to secret government information?

As things stand now, a firm can transfer such a man to non-government business in another division, if this is possible. If a plant is on defense work exclusively, of course, denial of access to classified government matter is tantamount to discharge.

TITANIUM PLATE is heated in furnace of Sharon Steel plant as part of integrated sponge-to-sheet operation of Mallory-Sharon in Niles



BREAKDOWN OPERATION is reducing ½-in titanium to ⅛-in. sheet. P R Mallory and Sharon Steel formed Mallory-Sharon Titanium in 1951

MALLORY-SHARON EXPANDS:
New Melting Plant Triples Titanium Output

NILES, OHIO — A new plant that triples its titanium melting capacity has just been opened by Mallory-Sharon Titanium Corp here. The new plant houses four double-melting furnaces, used for both first and second stage melting of titanium from sponge to ingot form, increasing their capacity to 3-million lb a year.

Opening of the plant was marked Mar 8 by a "Titanium Day" program in Niles that included tours of the laboratory, melting plant, and rolling mill, and a technical panel.

Safety Is Paramount

Personnel safety has been emphasized in the new plant. Furnaces are arranged in explosion-proof steel barriers with relief walls that vent to the outside of the building. Technicians who operate the process are stationed at remote control panels. These precautions are taken because of the high temperatures involved in melting.

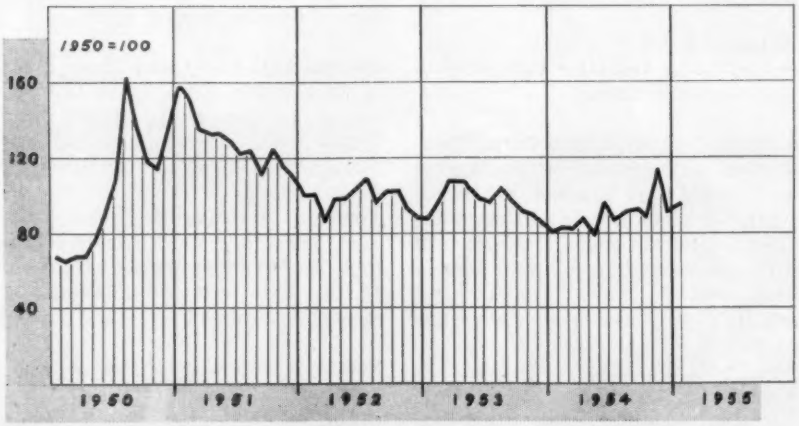
The new furnaces are said to combine the best features of Mallory's "Method S" consumable electrode-double melting and new vacuum-melting techniques. Titanium sponge is pressed into long electrodes on large hydraulic presses. The electrode is then fed into a vacuum melting furnace and arc melted to form a solid ingot. This "first-stage" ingot is then used as an electrode in a second melting operation.

Homogeneous Ingots

Mallory-Sharon is staking its claim on this process, which is said to produce ingots that are highly homogeneous and display the same characteristics throughout the ingot, and on its research program.

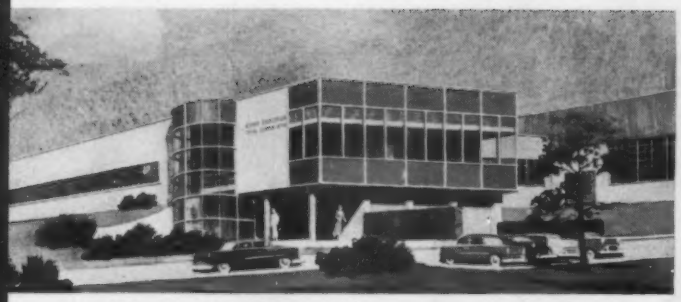
The laboratory in Niles, working exclusively on titanium, is concentrating on both alloy development and other basic research and on the development of processes and equipment. MST has patented a rolling method reported to reduce oxidation when titanium is heated for rolling.

The expansion indicates MST's faith in the future of titanium. The present lag in demand that has resulted in excess production, they feel, is the result of the wait by manufacturers for assured production quantities before comitting new aircraft designs to titanium.



Index of New Orders for Machinery Shows Slight January Upturn

JANUARY MACHINERY ORDERS WERE ON THE UPGRADE AGAIN after a December drop. As shown here on the McGraw-Hill Index of New Orders for Machinery (except electrical) January orders rose four points to 94 (1950 = 100). Highest figure for 1954 was November's 114, lowest was May's 79. Index is seasonally adjusted



50,000-sq-ft jobbing toolroom . . .
is the nucleus of Kidde Precision Tool Corp's new $1 million Roseland, N J, plant designed to turn out precision pilot jobs, some from 347 stainless

140,000-sq-ft electric shaver plant for Schick . . .
to be built on a 56-acre site at Lancaster, Pa, will give Schick largest production capacity in the electric shaver industry. Entire plant will be atmosphere-controlled

Companies in the News . . .

Gleason Works, Rochester, N Y, machine tool builders, is said to be building the world's most modern foundry. Special emphasis is being placed on controlling sound—long a foundry bugaboo.

Delco-Remy Division of GM is building a storage battery plant at Olathe, Kansas, to be completed next spring and employ 300.

DeVlieg Microbore Co has completed its 15,000-sq-ft plant at 2720 W 14-Mile Rd, Royal Oak, Mich, marking the company's fifth major plant expansion in five years.

Press Automation Systems Inc has been formed at 18212 James Couzens Hwy, Detroit, by Maurice M Clemons, former master mechanic of Chevrolet's Cleveland Pressed Metal Division. Plant will engineer special automation equipment, and will sell feeders and unloaders made by Hamilton Automation Co of Hamilton, Ohio.

Chrysler Corp plans to build an 800,000-sq-ft automatic transmission plant on the outskirts of Kokomo, Ind. Plant's output will supplement existing facilities for output of PowerFlite transmissions for Chryslers. At full production, the plant will employ 3500 workers.

Detroit-Michigan Stove Co and **Welbilt Stove Co** are merging. Corporate name of the new combine will be **Welbilt Corp,** which will use D-M's Detroit plant and Welbilt's Maspeth, L I, N Y, plants.

Servel Inc, Evansville, Ind, whose output has been confined to aircraft components since the end of last year, has recalled 600-800 of its 1700 laid-off workers and will resume output of refrigerators, air conditioners, freezers and water heaters.

Whirlpool Corp, St Joseph, Mich, has purchased **Motor Products Corp's** Marion, Ohio, plant, will use it to make clothes dryers.

Food Machinery & Chemical Corp plans to acquire **Chiksan Co,** Brea, Calif, makers of swivel joints and wing-nut unions, will operate it as a division.

Hubbard & Co, Pittsburgh, has purchased **Locke Insulator Co's** poleline hardware operations.

Baldwin-Lima-Hamilton Corp. Philadelphia, has a cross-licensing agreement with **Carl Schenck** of Darmstadt, Germany, involving test equipment and strain gages. Baldwin will make and sell Schenck fatigue-testing equipment: Schenck will make and sell Baldwin strain gages and equipment.

Valenite Metals Corp, Royal Oak, Mich, whose output of tungsten carbide tips and tools to date has been issued to a limited group of user plants for production test purposes, now has released its output to the general market.

Plomb Tool Co, Los Angeles, has purchased **Industrial Tools Mfg Co,** also of Los Angeles.

McDowell Co Inc, Cleveland engineering firm, has purchased **Sintering Machinery Corp,** Netcong, N J, for about $500,000.

Douglas Aircraft Co will go into production of Nike guided missiles at the Charlotte, N C, plant formerly occupied by the area Army Quartermaster Dept.

Houdaille-Hershey Corp, Buffalo, plans to buy **Frontier Industries Inc,** also of Buffalo. Frontier makes lubricating machinery, does defense manufacturing, and controls **Fairmount Tool & Forging Inc** of Cleveland.

Aluminum Co of America will produce titanium aircraft jet engine parts at its Cleveland Works, forming the parts on Air Force Heavy Press Program forging presses.

Electric Auto-Lite Co's bumper plant at Sharonville, Ohio, is in full operation, producing up to 12,000 units a day. Plant has straight-line production, and is highly automated.

American Machine & Foundry Co, New York, has acquired **American Iron & Machine Works,** Houston, Texas, maker of oil-field drilling and recovery equipment.

Northrop Aircraft Inc has subcontracted $2.5 million worth of work on the Scorpion F-89D and the Snark B-62 pilotless bomber to **McDonnell Aircraft,** St Louis.

Blaw-Knox Co is incorporating its Process Equipment Dept into its newly enlarged and modernized Buflovak Equipment Division, Buffalo, first phase in a $15-million modernization program.

CHRYSLER CORP'S DODGE DIVISION PROMOTES..M C Patterson (left), general works manager of the Dodge Main Plant, to vice president, manufacturing, of the division; and **R S Bright,** director of the New Castle and Kokomo, Ind, plants, and a member of the executive staff, to divisional vice president

William L Shank, former vice president, manufacturing, at Ingersoll Milling Machine Co, has been named works manager of Kearney & Trecker Corp's special machinery division

Names in the News . . .

Paul W Brannon, former vice president and works manager of the Pesco Products Division of Borg-Warner, has been appointed manufacturing vice president of Cloyes Gear Works, Cleveland, Ohio.

J Joseph Kelly, former field sales manager of Package Machinery Co, has been appointed sales manager of Reed-Prentice Corp, Worcester, Mass, affiliate.

Jay W Schnackel, general manager of International Business Machines Corp's Endicott, NY, plant, has been promoted to vice president of the company, in charge of manufacturing. Former Assistant General Manager **Arthur L Becker,** succeeds him.

Louis G Helmick, Jr, manager of manufacturing for Joy Manufacturing Co, Pittsburgh, Pa, has been elected vice president of manufacturing.

John N Roche, formerly of Henry & Wright, Division Emhart Manufacturing Co, has joined Motch & Merryweather Machinery Co, Cleveland, as a press specialist to serve in an advisory capacity on all sales of the H&W dieing machine.

Harry O Whipple, formerly factory manager of Rockwell Manufacturing Co's Columbus, Ohio, plant, has been named general manager of the new plant to be built at Russellville, Ky.

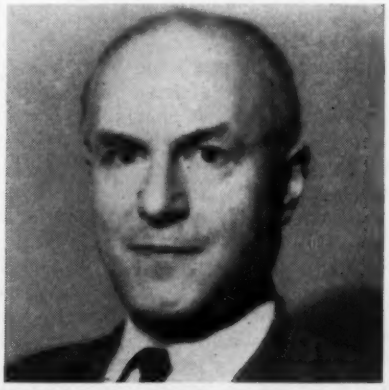
T V Purvin, general sales manager of Amgears, Inc, of Chicago, has been made general manager.

General Motors appointments: **Wallace E Wilson,** works manager of the Buick-Oldsmobile-Pontiac Assembly Division's Kansas City, Kan, plant, to general manager; **Edward D Rollert,** former head at Kansas City, to general manager of the Harrison Radiator Division at Lockport, NY, succeeding **Douglas B Whitney,** retiring after 36 years' service there.

H A Williams has been named director of purchases for Eaton Manufacturing Co, Cleveland, Ohio. Associated with the company since 1944, Mr Williams succeeds **Vincent Cada,** retiring after 38 years with the organization.

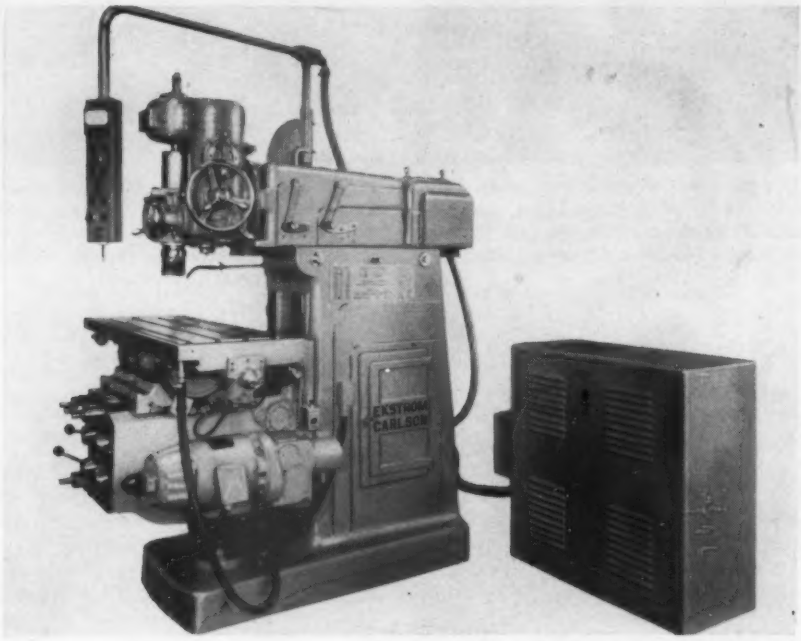
Dr M Eugene Merchant, assistant director of research, Cincinnati Milling Machine Co, has received the annual award of the Technical & Scientific Societies Council of Cincinnati as outstanding engineer of the year

N Douglas MacLeod, Jr, assistant general manager of Abrasive Machine Tool Co, East Providence, RI, has been appointed executive vice president



Arnold S Rostan, former vice president of South American Technical SA of New York, Inc, has been appointed director of international operations for Morey Machinery Co, New York

New Shop Equipment,



Wider Operating Range For New Vertimil

Model 5VA vertical milling machine is a redesign of 5V said to possess the following advantages: minimum tooling required when machining compound angles, and no power loss; large capacity because of ram design; power feed to quill for boring operations; for toolroom or production; and maximum operator conveniences.

Machine is available with 5-, 10-, or 25-hp spindle drive motors providing 36 to 1240 rpm (5hp) or 72 to 2480 rpm. Table feeds are from 0.250 to 100 ipm in two stages with vertical table feed ranging from 0.070 to 38 ipm. Rapid traverse is at 100 ipm.

Worktable range is 29 in. longitudinally with 13 in. crossfeed; max vertical knee travel is 16 in. Table tilts 30° toward or away from operator. Spindle feeds of 0.003, 0.005, or 0.008 ipr can be selected with max vertical spindle travel of 8 in. Spindle head can be tilted 45° to either side.

Grease-seal bearings are employed in spindle design with remainder of head lubricated by oil-pump cascade system. The new knee and component parts use one-shot oiler together with cascade system.

Optional equipment includes: rotary tables (15, 18, or 21 in.); dividing head; quick-acting vise jaws; dial indicator for spindle; collets; cutters; T-slot bolts, straps, and nuts; chucks; and adapters.

Elkstrom, Carlson & Co, Dept M-1, 1400 Railroad Ave, Rockford, Ill

Cincinnati Grinder Handles Small Tools and Cutters

The No. 1 cutter and tool grinder has a capacity of 8-in. swing and 15 in. between centers. It features the cartridge-type grinding-wheel spindle mounted with double row of special preloaded anti-friction bearings. A reversible ½-hp motor drive built in to the wheelhead provides desired direction of grinding wheel rotation. Spindle speeds (6260 or 3730 rpm) are obtained from tooth-grip drive belt and sheave arrangement.

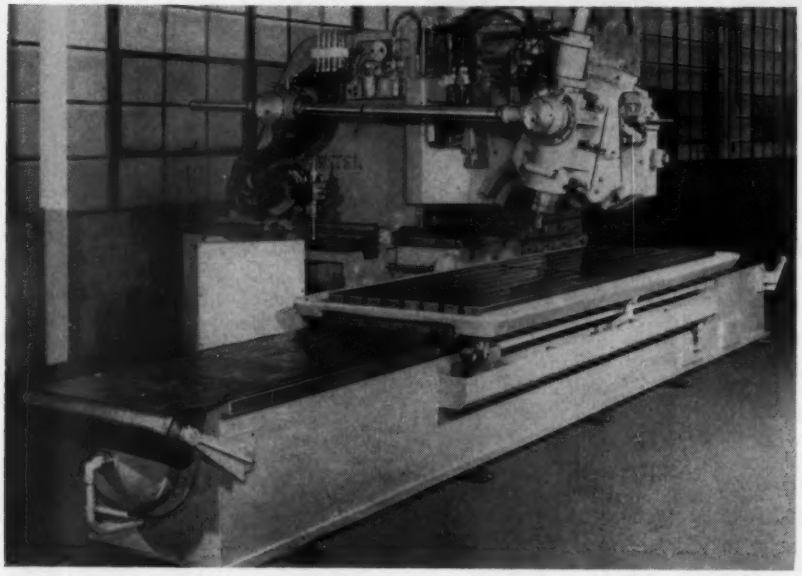
The anti-friction table slide provides ease of table movement. Duplicate controls give tool-grinding hand choice of five operating positions. Curtain dust guards protect anti-friction table slide and controls.

The 360° eccentric wheelhead swivel adds 3 in. to the conventional cross range of 4½ in. The swivel table "tange bar" taper-setting device, using precision gage blocks, enables operator to swivel table with high degree of accuracy. The double-end anti-friction spindle of the universal workhead accommodates No. 12 B & S (No. 5 Morse optional) taper shanks on one end and No. 50 Series NS on the other end. Clearance setting dials are on both workhead and left tailstock.

Various attachments extend the range of the machine for sharpening miscellaneous small cutters including those of sintered carbide. These attachments include: small-end-mill grinding; cylindrical grinding; surface grinding; internal grinding; gear-cutter sharpening; radius grinding; differential table traversing; and the index attachment for the universal workhead.

The Cincinnati Milling Machine Co, Cincinnati 9, Ohio

Materials and Parts . . .



Bridgewater Contour Milling Machines Provide Choice of Worktable Shape

Bridgewater has announced a new model of its contouring milling machine, known for its principle of combining 360° trace with angular twist of the spindle. The R310 has a rectangular worktable in lengths to 20 ft; the CD72 has a worktable 6 ft in diameter.

Tracing motions are guided by specially designed system of hydraulic control. Guiding brain is a tape cam made of Mylar fabricated into an endless belt, with templet form of piece to be milled. Cutting the templet form into the cam belts is done by machine itself. Co-ordination is accomplished by master perforation on tape which engages master tooth on geared rollers driving the belt.

The machines employ geared drive spindles with change-gear boxes to provide speeds from 100 to 3000 rpm. Interchangeable motorized spindles allow obtaining hp and speed ranges for contour milling various materials.

Longitudinal movement of the table and transverse movement of the ram are controlled and coordinated by the profile tape cam unit when using 360° trace.

The tilt cam unit mounted on the workhead actuates a hydraulic cylinder to vary the angle of the cutter in coordination with table and ram movements.

Combination movements of table and ram are possible either by the "joystick" method where the operator holds the stylus against the cam outline when manual operation is desirable, or the automatic method in which the stylus seeks the edge of the cam and follows it.

These machines offer a production approach to contour milling. Instead of incremental machining followed by hand "barbering," the combination of tilt, table, and ram movements permits the milling of one-piece forgings and castings with gradually changing angles of machined surface.

The basic principle of changing the angle of the spindle in a controlled relationship with the movement of the machine table is said to have been developed by Bridgwater years ago in their special machine for tire mold milling.

Bridgewater Machine Tool Co, Akron, Ohio

. . . including

MACHINE TOOLS AND ATTACHMENTS

Automatic Gear Grinders ..... page 186
Contour Milling Machine ..... page 188
Templet-Maker ..... page 190
Pinion Chamfering Machine .. page 192
Automatic Drilling Machine .. page 194
Automatic Feed Units ..... page 200
Vertical Boring Mill ..... page 202

TOOLS AND ACCESSORIES

Belt-Disk Sander ..... page 186
Double-Duty Toolholder ..... page 194
Aluminum Piercing Unit ..... page 198
Portable Grinder ..... page 202

FORMING AND CASTING

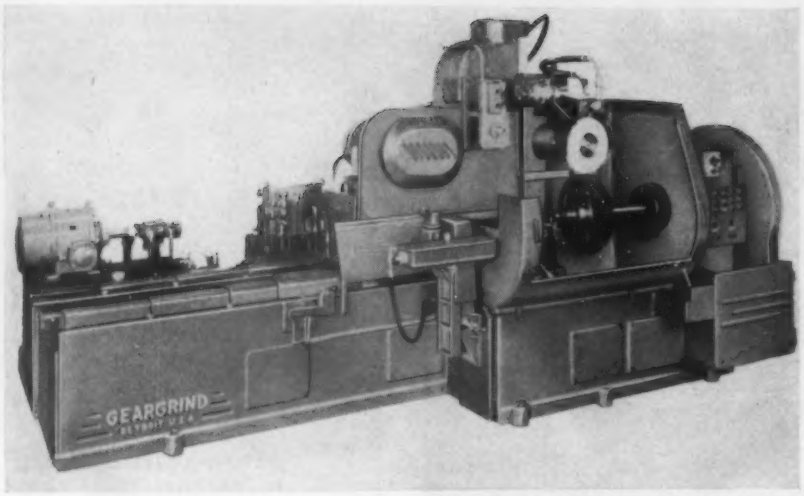
Aluminum Die-Casting Machine ..... page 194
Metalworking Presses ..... page 196
Injection Molding Machine .... page 196

INSPECTION AND PLANT SERVICE

Height Gage ..... page 190
Layout Equipment ..... page 196
Piston Pin Gage ..... page 198
Transfer Machines ..... page 198

PARTS AND MATERIALS

AC Motor Line ..... page 187
Heavy-Duty Carbide ..... page 196
Gravity Filter Unit ..... page 200



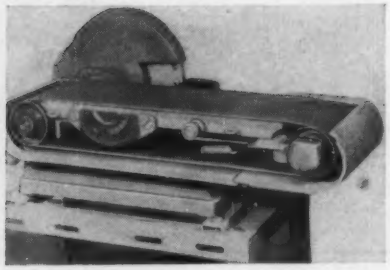
Automatic Gear Grinders Handle 30-in. Internal, 36-in. External

Automatic form-grinding machines, with capacity of 30-in. internal or 36-in. external, work on gears, splines, and specially contoured parts. It is reported that ease and speed of retooling is a feature of machine versatility, generally requiring only change of contour forms, index plates, and holding fixtures or arbors. In addition, the manufacturer states that production rates will exceed or equal that of similar-purpose machine. On both machines the grinding-wheel carriage — equipped with 6-in. face-grinding wheels width—will make 55 cuts per minute.

The workhead spindle is hollow and reported exceptionally rigid. Provision has been made for long workpieces to go completely through workhead spindle. The tailstock has been redesigned to use pillow blocks in place of receding centers.

Selection of several types of variable speed drive is offered. If desired, the external grinder can be equipped with either of two sizes of internal grinding attachments.

Gear Grinding Machine Co, Detroit, Mich



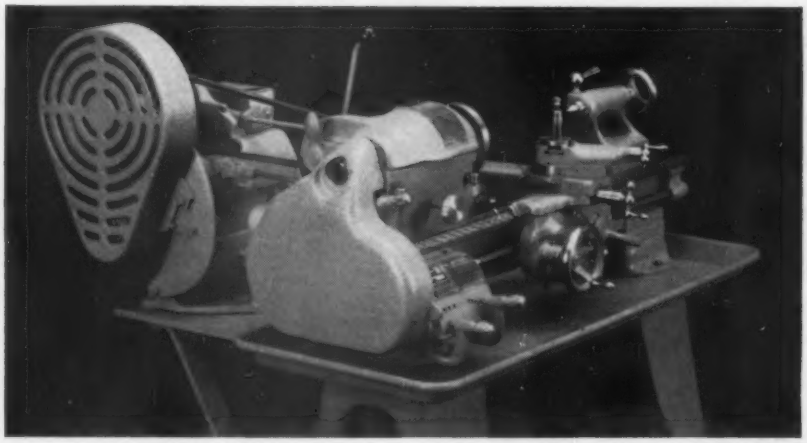
Belt and Disk Sander

Duro belt and disk sander includes balanced 10-in. disk and 6-in. belt sander on 24-in. surface. Sander can be operated horizontally or vertically. Although both sanding surfaces operate simultaneously on sealed ball bearings, they can be used individually. An auxiliary tilting worktable (45°) is interchangeable for use with belt or disk.

Incorporated in the basic design is the preloaded belt tensioning lever which allows fast changing of belts without usual re-tracking and re-tensioning. Hinged guard cover encloses driven drum and swings away to permit use of end drum for sanding curved objects. Provision has been made to accommodate fence assembly which can be moved across belt and titled 45° in either direction.

Standard equipment includes work table, miter gage, machine pulley, and one each aluminum-oxide belt and disk. Complete price is $115.

Duro Metal Products Co, 2651 N Kildare Ave, Chicago 39, Ill



Small-Swing Lathe Line Introduced by South Bend

A line of 9- and 10-in.-swing self-contained, motor-drive floor lathes, was designed to combine the advantages of floor mounting with the economy of bench lathe construction. The twelve-speed self-contained motor-drive unit is permanently mounted back of the headstock. Spindle speeds are 48 to 1435 rpm for the 10 in. and 50 to 1270 rpm for the 9 in. Direct-belt drive to the spindle provides smooth operation at high speeds. Slow spindle speeds are driven through back gears. A quick-acting belt-tension release permits releasing tension of cone pulley belt to change speeds.

Heavy cast-iron legs provide rigid support for the lathe bed. Chip pan is welded steel construction. Four bed lengths provide distances between centers of 16 to 34 in. The 9-in. lathes take work to 9¼-in. dia over the bed and 5½ in. over the saddle cross slide. Max swing for the 10-in. lathes is 10 in. over bed and 6¼ in. over cross slide.

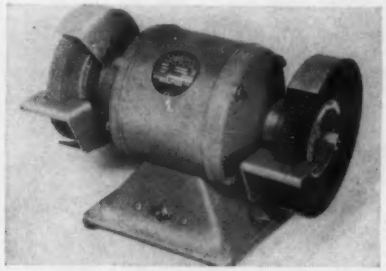
Both sizes are made in quick-change-gear and standard-change-gear models. The first provides 48 screw threads 4 to 224 per in., 48 power longitudinal feeds 0.0015 to 0.0255 in., and 48 power cross feeds 0.0004 to 0.0255 in. The standard change equipment provides 45 threads, 4 to 160 per inch.

South Bend Lathe Works, South Bend, Ind

Low-Hydrogen Electrode

Strikeasy LH-1 is reported by GE to have a deposition rate 61% faster than conventional E-6016 electrodes. It is said that the powdered metal in the coating contributes to the weld, making possible higher speeds.

General Electric, Welding Dept, Schenectady 5, NY

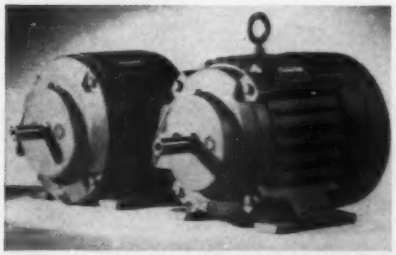


Bench Grinder

This bench grinder has a 1/3-hp capacitor-type motor which is fully enclosed with sealed-in ball bearings and rated at 3450 rpm. Designated Type R, it comes with one fine and one coarse grinding wheel and tool rests are adjustable to compensate for wheel wear. Wheel guards may be removed to attach buffing, polishing wheels. A chuck is attached to the 15/16-in. motor shaft and the company is making available drill-grinding attachments and other accessories.

Base is mounted on rubber feet and the on-off toggle switch is located on the front. A relay mounted in the base is used instead of the starting switch. Grinder is available with: 110-v, single-phase, 60 cycle or 220-v, 3-phase, 60 cycle.

Roberts Motor Co, 404 Union St, Bronson, Mich



Totally Protected AC Motors Introduced by Reliance

New line of totally protected ac Reliance motors are reported to combine eye appeal, rugged construction, and precision performance. Total protection extends from solid-cast frames to plastic sleeving that protects brazed coil-head connections in insulated heart of motor.

Regardless of mounting position, motor offers protection against drip, splash, and falling objects. Ventilation louvers are positioned high and dry in the end brackets. Frame extends beyond coil heads to give full protection to windings. Compact brackets insure shockproof shaft support by placing bearing mountings closer to frame. Neoprene gaskets afford positive seal between frame and conduit box and gaskets have indexed pressure knobs to securely hold each lead. Conduit boxes can be positioned in any of the four quadrants for ease of installation.

Three categories in the enclosed group are the fan-cooled, corrosion-proof, and explosion-proof design. Each is designed to withstand the abuses of the specific application—corrosion-proof outer fans and cast iron conduit boxes on fan-cooled; neoprene shaft slingers and optional stainless steel components on the corrosion-proof; and brass shaft slingers affording 5-direction labyrinth fits on the explosion-proof motor.

Reliance Electric & Engineering Co, 1088 Ivanhoe Rd, Cleveland 10, Ohio

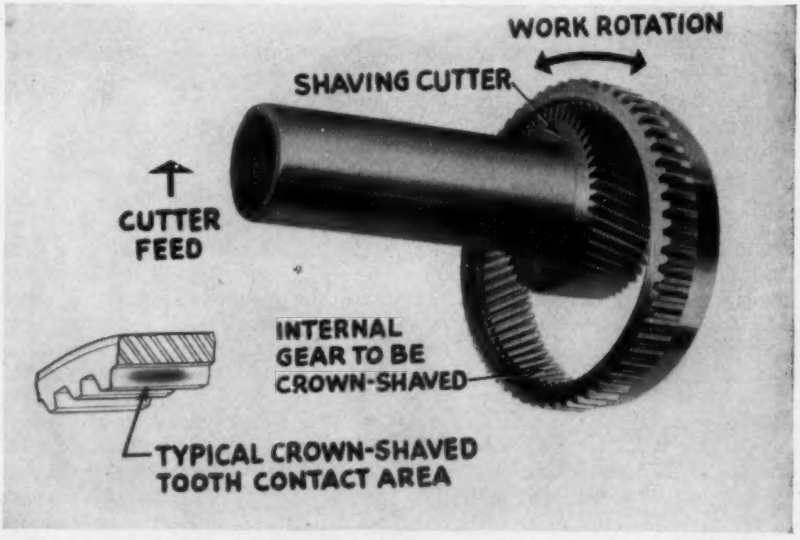
Ultrasonic Washing Units In Various Models

The basic washing unit consists of a trough to contain the warmed organic solvent onto which the ultrasonic transducer is placed and attached. Circulating pump and filter moves and cleans the solvent solution. Quartz transducers developing over 20 watts per square centimeter and magneto-strictive types are driven by high-frequency oscillator developing from 400 to 10,000 watts of sound energy depending upon the model used.

In the case of quartz transducers with output as great as 20 watts per square centimeter, high RF voltages must be impressed across the quartz crystal. To prevent inefficient conversion from electrical to sound energy, the units have special pressurized dry-air housings for the transducer and also are water-cooled. Dry air at 27 psi increases the voltage insulation properties of the air surrounding the transducer. Compressed air cylinders and reduction valves are supplied with each unit.

Units are available in an assortment of trough sizes and with range of sound power output.

Curtiss-Wright Corp, Industrial & Scientific Products Div, Caldwell, NJ



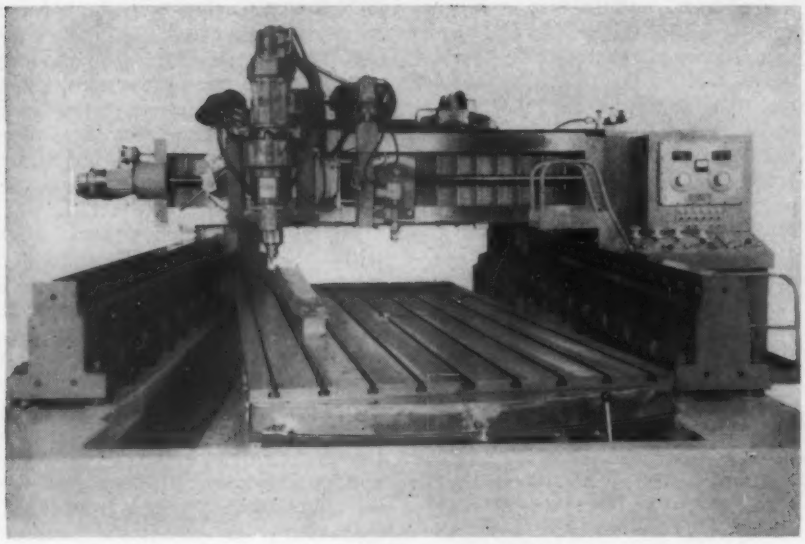
New Plunge-Cut Shaving Process By National Broach & Machine Co

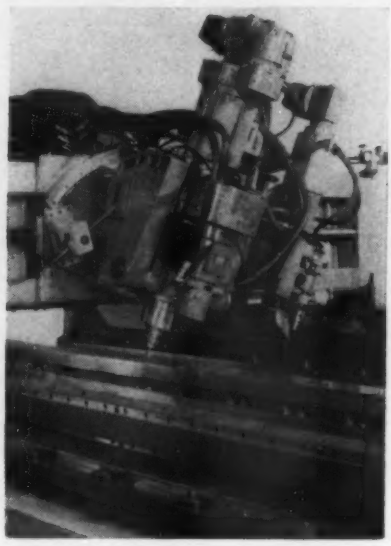
New plunge-cut rotary shaving process produces crown-shaved tooth surfaces in internal spur or helical gears. It is reported that gears can be produced, with or without crowning feature, at twice the rate of conventional methods using cutter or work reciprocation.

Tooth shape produced is like that of Elliptoid form. Maximum thickness zone can be positioned either side of center. Amount of crown can be varied. Process is reported particularly adaptable to internal gears in automatic transmissions and other geared drives operating under relatively high loads at high speeds.

Process can be accomplished on recently developed Model GCR machine, mounting gear on workhead, then meshing cutter with gear and hand-feeding it against stop. Cutter is fed up to depth in predetermined increments with no cutter reciprocation. Cutter is slightly wider than gear teeth being shaved.

National Broach & Machine Co, 5600 St Jean Ave, Detroit 13, Mich





Copymill — High-Speed Contouring of Aluminum Alloys

Copymill was developed as a basic milling machine for the high-speed contouring of aluminum alloys. Basically it is a traveling-bridge machine. Table and work remain statiinary while the bridge structure, carrying the cutter head and three-dimensionl contour controls, travels stationary while the bridge structure, travels along the guideways on four large rollers turning on precision tapered roller bearings. Longitudinal motion is imparted through two spur gear racks engaged by two spur pinions driven through torque-tube construction by single fluid motor.

The cutter head is carried on a saddle moved along hardened and precision ground ways by a rotating screw in a fixed nut, operated through a fluid motor. The mounting of the cutter head is universally free to pivot.

Depth control is through a lead-screw construction integral with the head and exactly concentric with the spindle axis. The depth leadscrew is controlled by a fluid motor identical to the other two. A device called "Jumpout" is incorporated in the cutter head—when a chip lodges under the cutter, device will instantaneously withdraw the cutter from the work.

The spindle is a nickel-chromium alloy rotating in moderately preloaded cylindrical roller bearings. Thrust loads are taken by separate ball thrust bearings. The spindle assembly is of the quill-type construction with spindle driven by fluid motor. Speed range is variable from 1000 to 10,000 rpm in two ranges. A large flywheel assures smooth torque input to cutter. Actual spindle speeds are registered by tachometer on control panel.

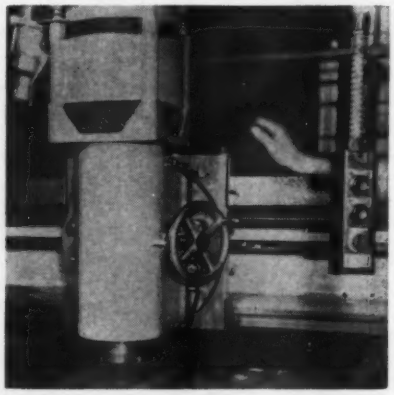
Mercury can supply specially designed cutting tools of any profile from ¼ to 12-in. dia. These tools are designed to use either industrial diamonds, tungsten-carbide, or stellite.

The longitudinal guideways are made of high tensile hardened and precision ground Meehanite, mounted on fabricated steel pedestals, and optically aligned when machine is installed. The entire guideway structure is mounted on a steel reinforced concrete pier and after the guideways are aligned and leveled, the machine itself is used to mill the seating pads for the worktable. These seating pads are actually aluminum blocks set into the concrete table foundation.

The worktable is provided with a centrally located pivot allowing 7½° motion each side of center. Table is moved by hydraulic pump and cylinder. While the machine currently being produced has a working area of 72 x 180 in., design is adaptable to a width of 120 in. and unlimited length.

The duplicating system is a 3-dimentional electrical-hydraulic contour unit in which a full-size master is reproduced through a tracing finger. It has a compound stylus which registers depth, and any horizontal component, depending upon the quadrant in which it is operating. Double hydraulic motors are incorporated in both the lingitudinal and transverse drives allowing a speed range from 0 to 300 ipm.

Mercury Engineering Corp, 2100 N Farwell Ave, Milwaukee 2, Wis



20-hp Milling Head Converts Planers

This milling spindle, driven by 20-hp, 1200-rpm, glass-wound, fan-cooled motor is connected directly to the motor rotor. Vertical adjustment is by ways rather than spline. Purpose of the unit is to convert planers and old milling machines to high-speed carbide milling.

Four table speeds can be chosen, ranging from 30 to 120 ipm. The standard equipment Loadmeter will shut off the feed motors if the spindle is overloaded. As auxiliary equipment, a constant feed device is built around the Loadmeter.

The Detroit Milling Cutter Co, 28625 Grand River, Farmington, Mich

FYI

FOR YOUR INFORMATION

FREE Catalogs, Booklets, Charts, Calculators

FYI – these initials symbolize information that's important. And there is much of importance in the literature listed here. To get the ones you need, all you do is fill out one coupon for each booklet you wish to order. Indicate in the circle on the coupon the number of one catalog wanted. When you have filled out a card, detach, stamp, and mail. We'll do the rest.

MACHINES AND ATTACHMENTS

1 BROACHING MACHINE — *Colonial Broach Co, Detroit 18, Mich.* 4-page bulletin FW-55 provides illustrated information on Colonial 4 Convertible for horizontal pull broaching and vertical push and pull-down broaching and press work. Design, construction, operating details, dimensions, included.

2 ROTARY STRAIGHTENING — *Mackintosh-Hemphill Co, Pittsburgh 8, Pa.* Technical bulletin No. 55 "How to Straighten Pipe and Tube" is a 24-page illustrated brochure covering ferrous and non-ferrous materials. Two-plane corrective bending and rotary methods discussed; operation, features, and advantages of rotary machines detailed.

3 DRILL UNITS—*Michigan Drill Head Co, Detroit 34, Mich.* 24-page catalog describes feed units, tapping units, hydraulic drillpresses, index tables, fixed center and adjustable center drill heads, multiple drilling applications. Includes technical data on feeds, speeds, hp, required for drilling, recommended coolants for various materials.

4 HYDRAULIC PRESSES & DIE-CASTING MACHINES—*Lake Erie Engineering Corp, Buffalo 17, NY.* General catalog incorporates comprehensive chart relating various types of presses to best uses.

5 WIRE STRAIGHTENING, CUTTING MACHINES—*Lewis Machine Co, Cleveland 27, Ohio.* Bulletin 55-2 describes machines available in two wire size ranges: No. 2-C3 for wire from 1/16 to 3/16 in., and No. 2-C4 from 3/32 to 1/4 in.

TOOLS AND ACCESSORIES

6 FACE MILLING CUTTERS—*Lovejoy Tool Co, Springfield, Vt.* 42-page illustrated catalog 31 contains comprehensive descriptions of types A, H, J, L, and C, plus charts on applications, specifications, and catalog numbers for reference and ordering.

7 TAPS & DIES—*Winter Brothers Co, Rochester, Mich.* 32-page catalog 22 contains illustrated information on general purpose and special-application taps. Conversion table and prices included. Adjustable dies, die stocks, and die sets covered.

8 DIAMOND WHEELS — *Fish-Schurman Corp, New Rochelle, NY.* 31-page catalog DT-353 describes "Steelset" impregnated wheels, drills, and dressers; diamond particles are bonded in sintered steel matrix. Illustrated index simplifies ordering.

9 DRY-FILM LUBRICATION—*Acheson Colloids Co, Div, Acheson Industries, Inc, Port Huron, Mich.* 4-page bulletin 421 contains pictures, diagrams, charts, and data on advantages offered by colloidal graphite in assembly and run-in of machines.

10 COLLETS—*Hardinge Brothers, Inc, Elmira, NY.* 4-page illustrated selection guide (bulletin 54), for lathes, millers, grinders, includes specification and dimension charts, conversion and interchangeability listings, tabulated prices.

11 LUBRICANT—*Dow Corning Corp, Midland, Mich.* 6-page brochure on 41 Grease, a silicone fluid-carbon black mixture designed for high temperature, slow-speed bearings. Performance data on case histories illustrated. Applications, specifications, typical properties given.

12 PUNCH PRESS SAFETY TOOLS—*W I Martin & Co, Chicago 4, Ill.* 12-page catalog contains specifications and prices on aluminum and magnesium safety tongs, pliers, tweezers, vacuum press feeders, etc.

13 BENCH VISES—*Wilton Tool Mfg Co, Chicago 14, Ill.* Catalog sheet 662 illustrates and describes design changes. Specifications and prices given.

HEAT TREATING AND WELDING

14 SOFT-METAL MELTING EQUIPMENT—*General Electric Co, Sche-*

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED
AMERICAN MACHINIST, New York *Not good after* May 14, 1955

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED
AMERICAN MACHINIST, New York *Not good after* May 14, 1955

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED
AMERICAN MACHINIST, New York *Not good after* May 14, 1955

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED
AMERICAN MACHINIST, New York *Not good after* May 14, 1955

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED
AMERICAN MACHINIST, New York *Not good after* May 14, 1955

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED
AMERICAN MACHINIST, New York *Not good after* May 14, 1955

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED
AMERICAN MACHINIST, New York *Not good after* May 14, 1955

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED
AMERICAN MACHINIST, New York *Not good after* May 14, 1955

Reader Service Department
American Machinist
330 W. 42nd St.
New York 36, N. Y.

Place 3¢ Stamp Here

Reader Service Department
American Machinist
330 W. 42nd St.
New York 36, N. Y.

Place 3¢ Stamp Here

FYI
FOR YOUR INFORMATION

nestady 5, NY. 4-page illustrated publication GEA-6113 shows steps for selecting cast-in immersion heaters for melting specific types of metals, and varying quantities of each type. Thermostats and manual or automatic controls available described, as well as selection and application of melting pots.

15 QUENCH FURNACES—*Ajax Electric Co, Philadelphia 32, Pa.* 4-page bulletin 700 illustrates and describes electric salt bath units for austempering and martempering. Advantages, applications, operation covered.

16 IRON POWDER ELECTRODES—*The Lincoln Electric Co, Cleveland 17, Ohio.* Reprint of paper given before American Welding Society; covers theory, physical properties, operating characteristics, typical production applications, advantages because of higher deposition rates.

17 WELDING SUPPLIES AND ACCESSORIES—*Air Reduction Sales Co, New York 17, NY.* 36-page catalog ADC 848 covers complete line of arewelding and oxy-acetylene supplies—rods, fluxes, brazing alloys, holders, protection items.

PLANT SERVICE EQUIPMENT

18 SHOP EQUIPMENT — *Sturdi-Bilt Steel Products, Chicago 45, Ill.* 20-page general catalog 155 illustrates complete line of benches, bins, tool racks, illuminators, workshop accessories.

19 BLAST CLEANING MACHINE—*American Wheelabrator & Equipment Corp, Mishawaka, Ind.* Bulletin 124-B describes airless 48x42-in. Tumblast, employing tumbling principle in conjunction with hurling of metallic or non-metallic abrasives. Abrasive blasting principles discussed, typical parts processed, case histories.

20 PUMP—*Chempump Corp, Philadelphia 18, Pa.* 16-page illustrated bulletin 1010 contains detailed data on line of seal-less, leakproof centrifugal units in sizes from ⅛ to 7½ hp, capacities to 250 gpm.

21 PRESSURE-SENSITIVE TAPE—*Minnesota Mining & Manufacturing Co, St Paul 6, Minn.* 56-page manual illustrates wide variety of use for metalworking,—machining and finishing, electroplating, welding, painting, and miscellaneous operations.

22 ALUMINUM MATERIALS HANDLING EQUIPMENT — *Magnesium Co of America, Tobey Aluminum Div, East Chicago, Ind.* Illustrated data file describes weight, flexibility, and caster advantages of line of aluminum industrial trucks. Specifications for flatbed, multiple-deck and A-frame units; available accessories included.

23 INDUSTRIAL VACUUM — *Spencer Turbine Co, Hartford, Conn.* 12-page bulletin 155 illustrates stationary and portable equipment for conveying, servicing, bench work, reclaiming materials, etc. Specification tables and installation data included.

24 RENTAL PLAN FOR MATERIALS HANDLING EQUIPMENT—*Market Forge Co, Materials Handling Div, Everett 49, Mass.* 4-page illustrated bulletin 1107 describes Marforge Rental-Lease-Own Plan by which as much equipment as desired may be rented at low rate with options to purchase at expiration of leasing period.

PARTS AND MATERIALS

25 GEARS & SPROCKETS—*Universal Gear Works, Detroit 3, Mich.* 200-page catalog gives specifications and prices of 8000 stock items, including gears, sprockets, chains, splines, etc.

26 CARBIDE TIPS & TOOLS—*Vallenite Metals Corp, Royal Oak, Mich.* 33-page Catalog A contains illustrated, indexed data on standard blanks and tools. Grade recommendations and applications in tabular form; physical characteristics, dimensions included.

27 TORQUE CONVERTERS — *Clark Equipment Co, Transmission Div, Jackson, Mich.* 8-page catalog describes Torcon line. Illustrates models, attachments for specific adaptations, physical construction.

28 SPRING LOCK WASHERS—*Spring Washer Institute, New York 6, NY.* 16-page brochure illustrates and describes engineering principles. Standard specifications, dimensions, and engineering data in tabular form.

29 RZEPPA UNIVERSAL JOINTS—*Gear Grinding Machine Co, Joint Div, Detroit 11, Mich.* 12-page illustrated catalog covers applications, engineering data, models and sizes, proper joint selection.

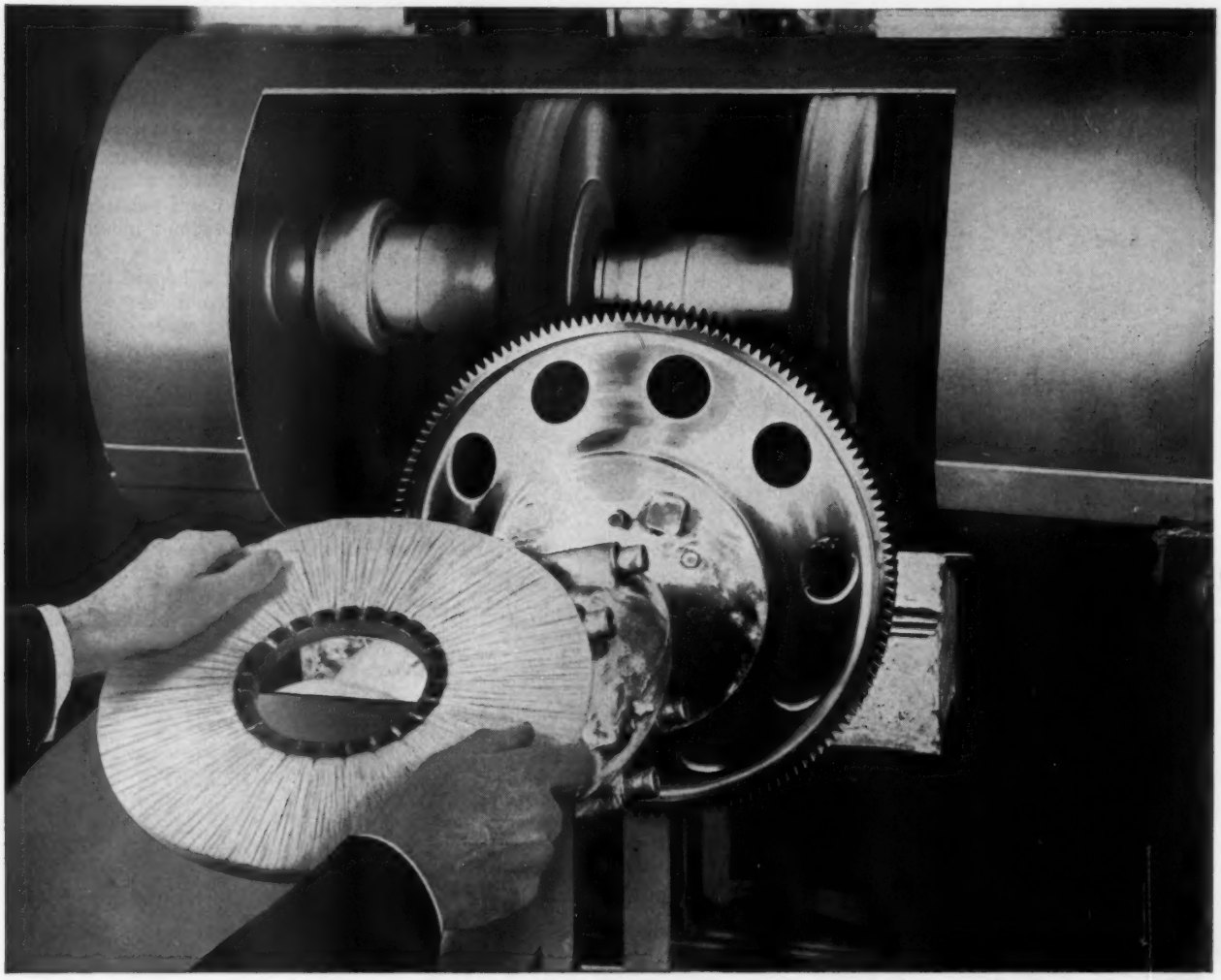
30 O-RINGS—*Garlock Packing Co, Palmyra, NY.* 18-page illustrated catalog AD-148 contains design information, recommended pressures, available materials for both dynamic and static applications; complete list of standard sizes.

31 SUBMINIATURE SWITCHES—*Micro Switch, Freeport, Ill.* 12-page illustrated catalog 75 covers snap-action precision switches, auxiliary actuators, toggle and pushbutton assemblies.

32 DOUBLE HELICAL GEARS — *Worthington Corp, Harrison, NJ.* 12-page bulletin 1958E contains illustrated dimensional data, design features, applications charts.

33 ADJUSTABLE SPEED DRIVE—*Dynamatic Division, Eaton Mfg Co, Kenosha, Wis.* 7-page illustrated bulletin SF-1 describes stationary field power transmission devices, known as Dynaspede liquid cooled, eddy-current couplings, adaptable to most adjustable speed requirements.

34 FILTRATION—*Engine Life Products Corp, El Monte, Calif.* 12-page engineering paper, "Filter Facts No. 1—Fundamentals of Filtration," covers filtering equipment and its relation to such subjects as the lubrication system, contaminants, detergent oils, filter materials.



Push-button brushing beats handwork 15 to 2

PRODUCTION EFFICIENCY IS HIGHER. *Now it's easier to produce uniform finishes on many types of gears. Setup is simple . . . operations are done on preset time cycles to cut manufacturing costs.*

What manual operations could an OBA eliminate for you?

7½ times as fast. Here, Osborn Fascut® Brushes are removing burrs and blending surface junctures on spur gears. Each gear has two internal and two external gear sides that must be finished. Rate . . . 15 gears or 60 gear sides per hour. Former rate with manual method was at best two gears an hour.

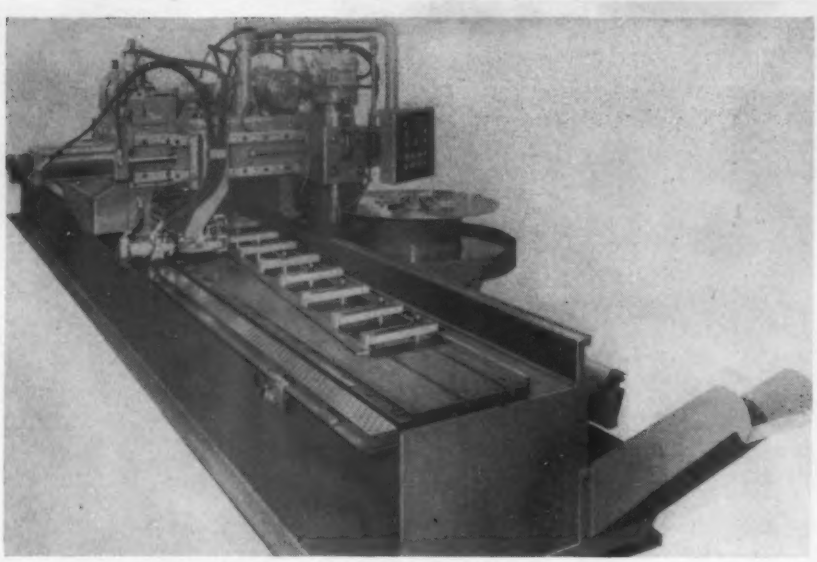
Scrap has been virtually eliminated by Osborn's Power Brushing method. That's because surface quality of gears is more uniform. Stress concentrations have been eliminated by the surface juncture blending of gear teeth.

An **O**sborn **B**rushing **A**nalysis can show you how to improve your operations through power brushing and benefit with savings like these on your cleaning, finishing and burr removal jobs. Call or write *The Osborn Manufacturing Company, Dept. C-30, 5401 Hamilton Ave., Cleveland 14, Ohio.*

Osborn Brushes

OSBORN

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES



Farnham Templet-Maker Simplifies Calculations

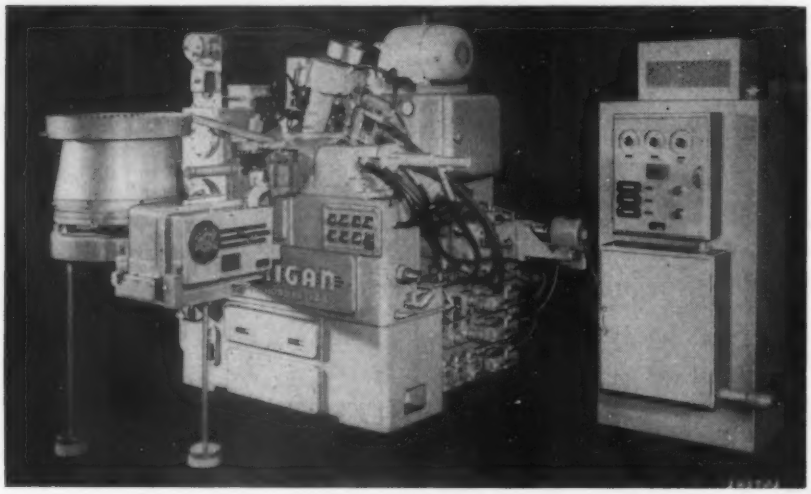
Fabrication of both straight and helical contour templets is reported to be speeded and simplified by the Farnham templet-maker. Because of the relationship of follower and cutter of templet-maker to cutter and follower of templet-following spar mills, skin mills, and other machine tools, templet contour is produced automatically and accurately transposed to part contour, it is reported.

Involved calculations to determine cutter-to-follower offsets are eliminated. Because the templet-maker cutter path automatically converts to the required circular path, helical templets are produced without lengthy computations and layouts.

The templet-maker is so designed that setup can be made from parts drawings by means of locating-point units and clamps which secure a spline bar or overlapping straight bars connecting the locating points. Low follower pressure permits tracing directly from sheet metal templets if desired.

Both straight and helical templets can be made from same setup. Straight blanks are secured to raised support rail on top of bed; helical blanks are clamped to rotating circular table driven through ring gear meshing directly with rack on bed. Movement of carriage rotates the table at the same ratio to carriage travel as corresponding templet holders on helical-templet spar mills.

Farnham Mfg Div, The Wiesner-Rapp Co, Inc, Buffalo 10, NY

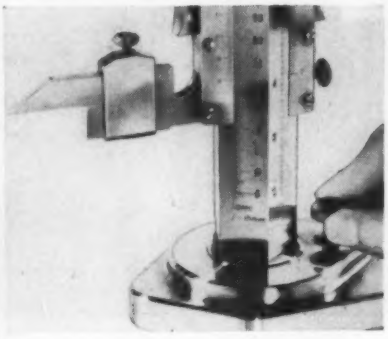


Automatic Gear Production Setup by Michigan Tool

Automatic gear production is accomplished with this Michigan Tool setup using the Model 1445 ultra-speed hobber (*AM*—Nov 8, '54 p 186), the Michigan 3-way gear classifier (*AM*—June 7, '54 p 218), and the Michigan gear controller. The controller automatically adjusts the hobber's center distance and keeps a statistical record of production as well as shutting down the line whenever the total pre-determined gear production is reached or should the helix angle not comply with specifications.

The only operation required of operator is to keep automatic loader full of gear blanks. When production shuts down automatically, a light on the controller panel flashes and the operator checks the controller counters to see where the difficulty lies. Shutdowns by hob shifter automatically indicate that the hob requires sharpening.

Michigan Tool Co, 7171 E McNichols Rd, Detroit 12, Mich



Height Gage Uses Triangular Scale Beam

A newly designed height gage introduced by George Scherr uses a triangular scale beam for superior strength and rigidity. The sliding head moves through its entire range by action of full-length large-diameter screw in rear of beam. Engaging nut is split and disengaged for quick approximate setting of head by pressing two lugs on sides and sliding head along beam. The fine-adjustment screw is located in the base.

In making adjustments, downward pressure on the screw helps to hold gage more firmly on surface plate. The vernier is 2.450-in. long compared to the ⅝-in.-long vernier of conventional height gages. Verniers are adjustable and accuracy of setting may be checked by use of master gage block furnished with each height gage.

Available sizes are 12, 18, 24, 40 and 48 in., priced from $120 to $585.

George Scherr Co, Inc, 200 Lafayette St, New York 12, NY

THE SIDNEY MACHINE TOOL COMPANY
over 50 years
of service to
AMERICAN INDUSTRY
SIDNEY • OHIO

it's a

SIDNEY HEAVY-DUTY LATHE

MAKING A SLEEVE FOR A TOOL GRINDING MACHINE . . .

AT

BELL AIRCRAFT

CORPORATION

IN

BUFFALO, NEW YORK

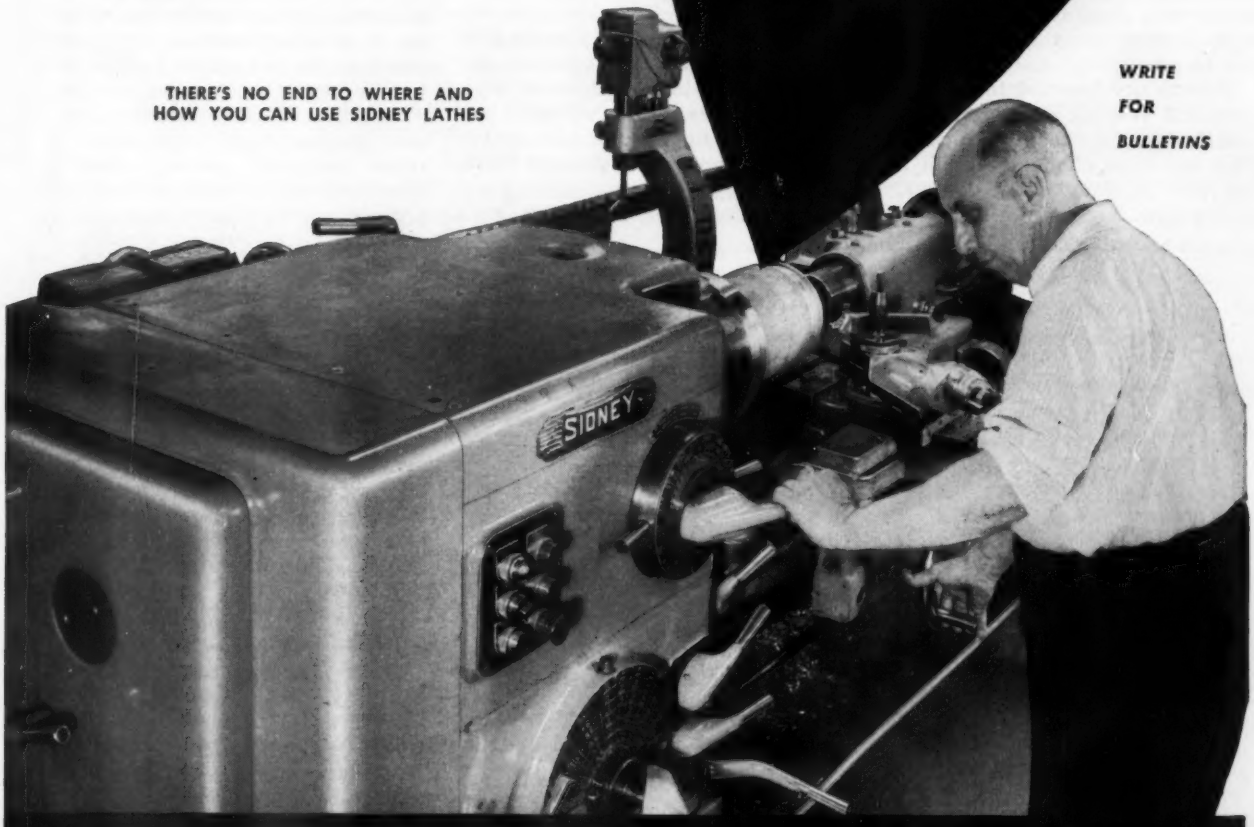
Operations like this are always interesting to concerns who need dependable, cost-cutting lathes for their own products or to build equipment for others.

For example, at Bell Aircraft, Buffalo, New York, this SIDNEY LATHE is making a sleeve for a tool grinding machine which will be used for grinding parts for their rocket engines. Naturally they need and get allowable tolerances of .001 (±) without any trouble.

Bell Aircraft also uses SIDNEY LATHES to machine gear cutters which are used in connection with their guided missile program.

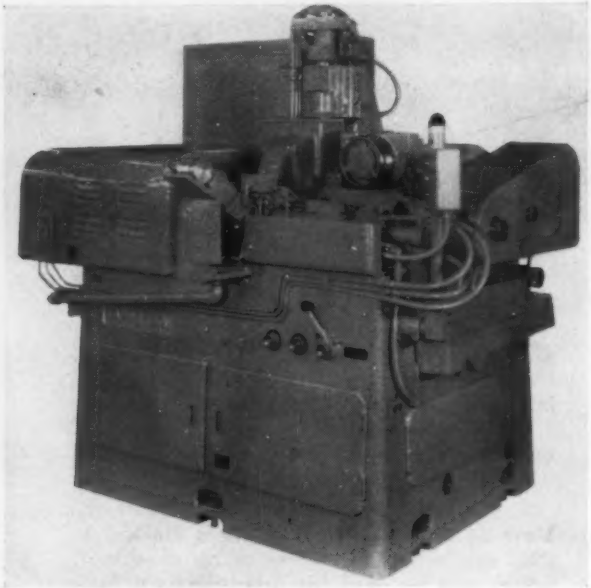
THERE'S NO END TO WHERE AND HOW YOU CAN USE SIDNEY LATHES

WRITE FOR BULLETINS



THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904



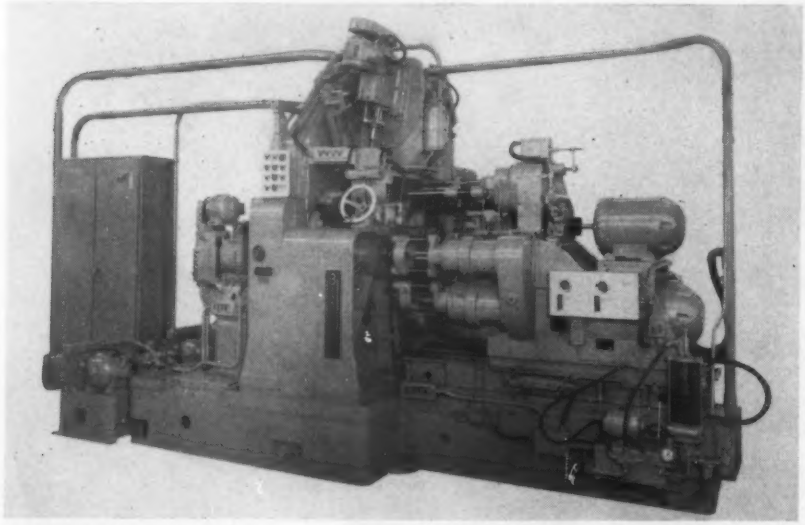
Automatic Chamfering Machine Handles Hypoid Pinions

Model BM-2148 Burr-Master has production rate of 250 pinions per hour and one operator can handle two machines. Pushbutton cycle is automatic with machine coming to stop with cutting tools retracted when cut is completed.

Pinions are inserted into opening provided in work station and radial locator lever is actuated by operator. This energizes clamping circuit and the part is clamped by depressing pushbutton. Machining time is 5 sec. and floor-to-floor time is 13 seconds.

Changing over from one pinion to another requires removal and replacement of upper and lower toolholders, upper and lower cutters, work driver, locating fixture, and set of change gears. Fixtures are doweled and keyed so that fixture and toolholders can be dropped into place and locked in set screws. HSS cutting tools used are specially developed form tools of dovetail type. Cutting is dry. Depth of cut is adjustable for single cutting stroke required to deburr and chamfer tooth.

Modern Industrial Engineering Co, 14830 Birwood Ave, Detroit 38, Mich



PUMP BODIES are drilled, tapped, and chamfered on this nine-station, drum-type high production machine which cycles in 21 seconds, completing 57 different holes in 14 different sizes. Machine is capable of drilling at rate of 12 ipm. Different pump models are interchanged by substituting the proper auxiliary head. These are reported to be the first cluster style heads designed to operate high-speed cutting tools at maximum speeds—*Barnes Drill Co, Rockford, Ill*

Automated Precision Grinder Developed by Landis Tool

This precision grinder automatically loads, grinds, and discharges automotive pistons. Aluminum pistons can be delivered to machine by conveyor and transfer mechanism and an automatic time loader places piston in grinding position with rotation beginning as grinding wheel advances rapidly to grinding position. Slow grinder feeds proceeds to positive predetermined size. After a timed sparkout period, grinding wheel retracts to back position and piston is ejected to another conveyor.

Aluminum pistons are ground by infeed method, using a wide wheel which reciprocates laterally. Pistons are elliptical in shape—produced by using master cam and rocking work cradle.

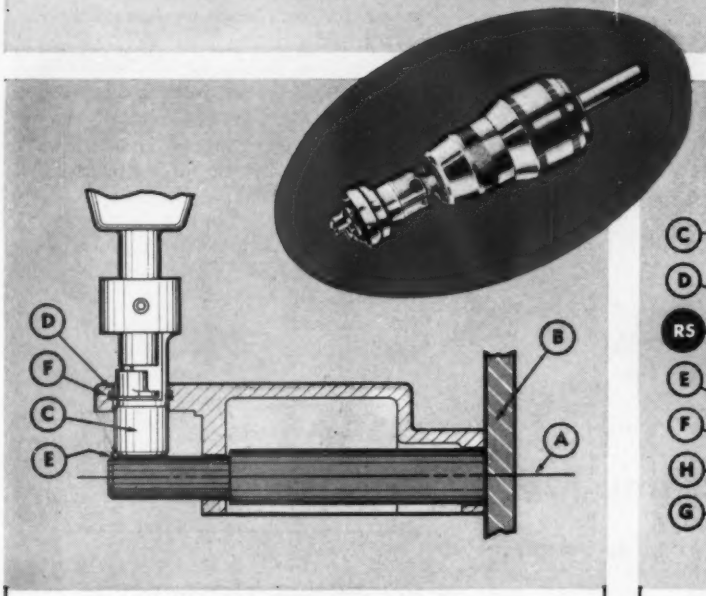
Wheel dressing is automatic after predetermined number of pistons are ground. The 5-in. type H piston grinder has microsphere bearings for both workhead spindle and grinding spindle. Bearings are of one-piece steel construction with babbitt lining and faces. Lubrication to microsphere bearings is automatic.

Landis Tool Co, Waynesboro, Pa

Circular dividing machine (Kesel, Germany) is completely automatic—started by a duplex pushbutton, stopped automatically by a revolution counter, preset for number of lines to be cut. It cuts lines up to 100 per minute, has capacity of 40 in. Extra hand-operated attachment is available for longitudinal divisions to over 12 in.

George Scherr Co, 200 Lafayette St, New York 12, NY

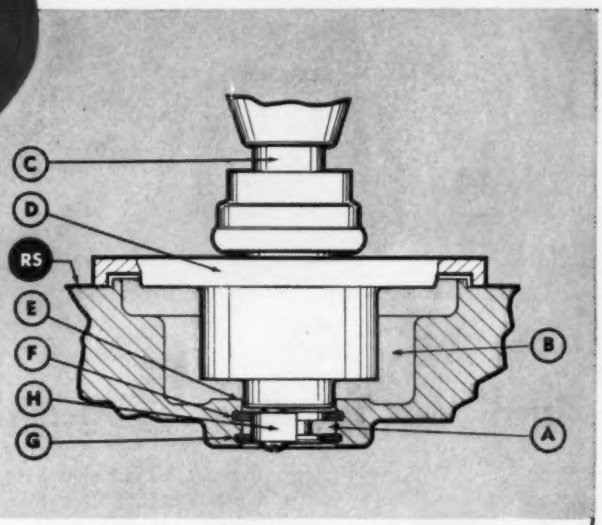
Waldes Truarc grooving tool solves tough internal grooving problems, cuts costs in assembly-line production



Problem: Locating a Groove From Centerline of a Hole A.

(a) Workpiece is fitted into plug on fixture plate ***B***.

(b) Bottom adaptor **C** on standard Waldes Truarc Grooving Tool is piloted into bore ***D*** and registers on side of plug ***E***. Groove ***F*** is cut in exact location required.



Problem: Cutting Two Grooves—One Rectangular, One Beveled—Located In Bore *A* In Large Cavity *B* of Workpiece, and Located From Reference Surface *RS*.

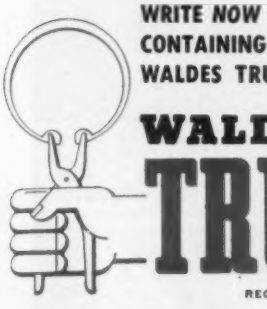
(a) Waldes Truarc Grooving Tool is fitted with elongated spindle assembly **C** and special bushing ***D*** which spans large cavity permitting tool to register on reference surface ***RS***. Bushing also pilots tool into counter-bore at ***E***.

(b) Both grooves ***F*** and ***G*** are cut simultaneously with special form cutter ***H*** having both required contours.

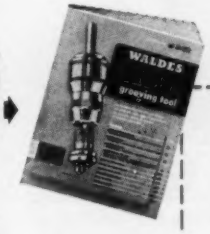
AMAZINGLY VERSATILE! The Waldes Truarc Grooving Tool adapts quickly and simply to your toughest recessing requirements. With it, even *unskilled labor* can perform and maintain high precision, mass production operations.

WIDE CUTTING RANGE! The Waldes Truarc Grooving Tool comes in five models: A-1, A-2, A-3, B and C. This wide variety of models enables you to cut accurate grooves in housings with diameters from .250 to 5.00 inches. Special features, modifications and adaptations allow each model to operate efficiently under many varying conditions.

SEND YOUR PROBLEMS TO WALDES! Whatever your internal grooving problem, send us your blueprints and let Waldes Truarc engineers give you a complete analysis, price quotation and delivery information on the most economical tool set-up for your particular job.



WRITE *NOW* FOR 20-PAGE MANUAL CONTAINING FULL INFORMATION ON WALDES TRUARC GROOVING TOOL



WALDES

TRUARC

REG. U. S. PAT. OFF.

GROOVING TOOL

MADE BY THE MANUFACTURERS OF
WALDES TRUARC RETAINING RINGS.
WALDES KOHINOOR, INC., 47-16 Austel Place, L. I. C. 1, N. Y.

WALDES TRUARC GROOVING TOOL MANUFACTURED UNDER U. S. PAT. 2,411,426

Waldes Kohinoor, Inc., 47-16 Austel Place, L. I. C. 1, N. Y.

Please send me your new 20-page technical manual on the Waldes Truarc Grooving Tool.

Name.....

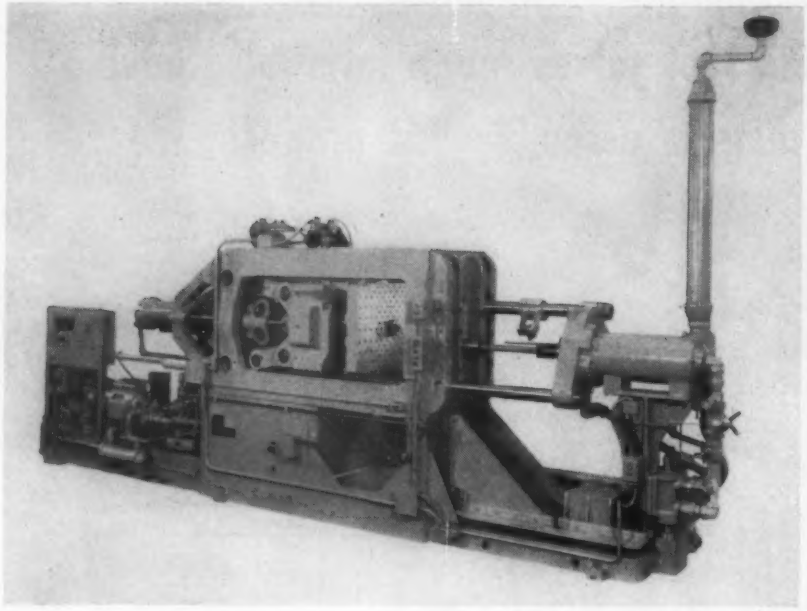
Title.....

Company.....

Business Address.....

City.....Zone.....State.....

AM-037



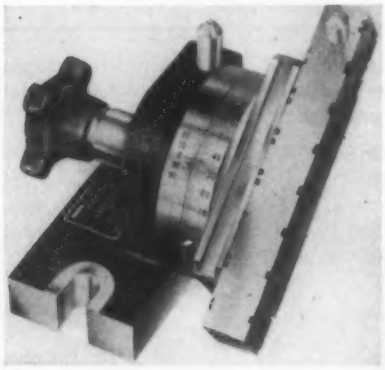
Aluminum-Die-Casting Machine

A 600-ton aluminum-die machine, the HP-3X-SF, will cast up to 16 lb of aluminum or proportionate weights of magnesium or brass and is convertible to zinc die casting. Machine provides 33,200-psi maximum pressure on metal. Both shot speed and pressure are adjustable. A shot position allowing 6 in. of adjustment is combined with a device which hydraulically elevates the entire shot system.

The one-piece alloy steel frame has a large beam area equal to 8-in. tie bars. Die setup is reported to be simple because of the single-hand-crank die-height adjustment. Die opening is 14 in. The movable platen is 40 in. wide with vertical clearance between beams of 28¼ in. A 26 x 42-in. opening in top of frame means the die space is accessible from all sides.

Pumping system uses a 25-hp motor and includes a 2000-lb booster pump. Timed casting ejection is provided by central hydraulic ejector.

Lester-Phoenix, Inc, 2711 Church Ave, Dept N-41, Cleveland 13, Ohio



Double-Duty Tool

Double-duty tool embodies elements required for angle-truing wheel dresser service and serves as accurate toolholder. The vernier scale (0 to 180°) can be set within 5 min. As a precision toolholder the Rothfuss G-2 holds toolbits up to 1-in. square. All exposed parts are chrome-plated. Base is Meehanite and handle and tool clamps are painted in rust-proof crackle finish. Price is $87.50 complete with diamond.

Rothfuss Tool Co, Box 202 Elmwood Sta, Providence, RI

Machine Automatically Locates, Drills Holes up to ½-in.-dia

Model 24 automatically locates and drills any number of holes up to ½-in.-dia in rapid sequence on a wide variety of work up to 24 x 48 in. or longer. Machine has adjustable speed drilling unit, 275 to 4250 rpm, which drills to any desired depth; rate of feed can be adjusted to meet material requirements.

Operator sets length and width dimensions in increments of 0.001 in. on decimal dials and presses direction controls to set machine in motion. Drilling unit moves crosswise to selected width dimension, while table moves the work to length dimension. As soon as selected position is located, drillhead is automatically actuated. Drilling operation can be controlled manually, if desired.

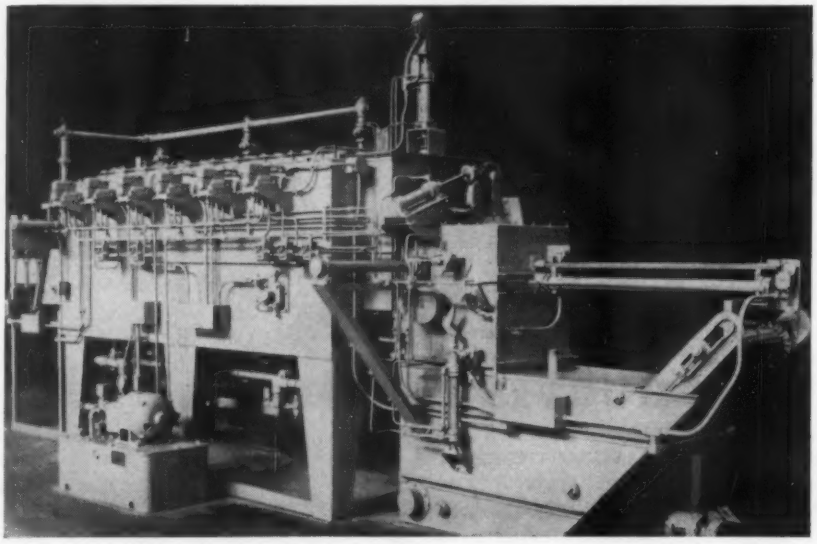
Hillyer Instrument Co, Inc, Dept 26, New York 13, NY

Radiant Tube Furnace

A gas-fired vertical radiant-tube hydraulic pusher production carbonitriding and gas carburizing furnace has been designed to handle production loads of small parts requiring neutral hardening, carbonitriding, heavy and medium case gas carburizing and carbon restoration.

Heating is by means of 20 radiant tubes, 10 per zone, made of Inconel and suspended from the top plate. Total input rating is 1,630,000 BTU/hr, 815,000 in each zone. Maximum temperature rating is 1850 F.

Lindberg Engineering Co, 2450 W Hubbard St, Chicago 12, Ill



Arc welding of the Filter/Separator.

Gasoline Filter/Separator made by Bendix-Skinner Division almost entirely of Revere 90-10 Cupro-Nickel.

It has been found that minute traces of water in aviation gasoline can stop the engine when flying in low temperatures, as at high altitudes, or over the pole. The amount of water involved is so small that it would not bother an automobile carburetor. To remove it for safe flying requires a special Filter/Separator. All metal parts going into this filter were specified to be 90-10 Cupro-Nickel. One of the contractors for the U. S. Navy is the Bendix-Skinner Division of the Bendix Aviation Corporation, Royal Oak, Mich. When Bendix-Skinner obtained the order, it called in Revere's Technical Advisory Service. A complete study was made of the blueprints and specifications, in order to set up the most economical purchasing schedules. When production began, personnel from the Welding Section of the Research and Development Laboratory maintained by Revere in Rome, N. Y., went to the Bendix-Skinner plant to share their know-how with the welders, so as to be sure the welds would pass strict inspection, yet be made at competitive costs.

Cupro-Nickel, 90-10, is highly resistant to corrosion and other forms of attack. Because it contains only 10% nickel, it is more economical than the richer alloys, yet in many applications just as satisfactory. We suggest you look into it.

REVERE

COPPER AND BRASS INCORPORATED

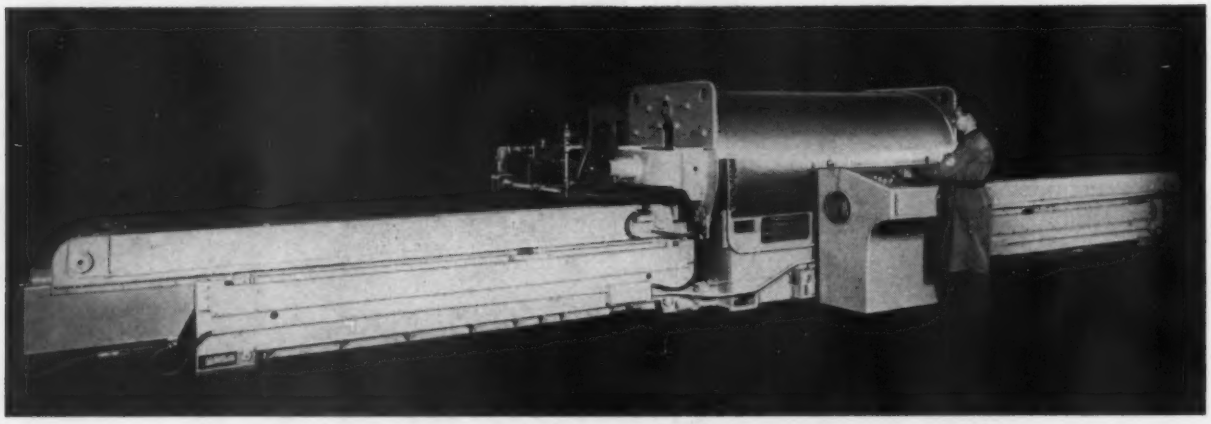
Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

• • •

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.

Sales Offices in Principal Cities, Distributors Everywhere.



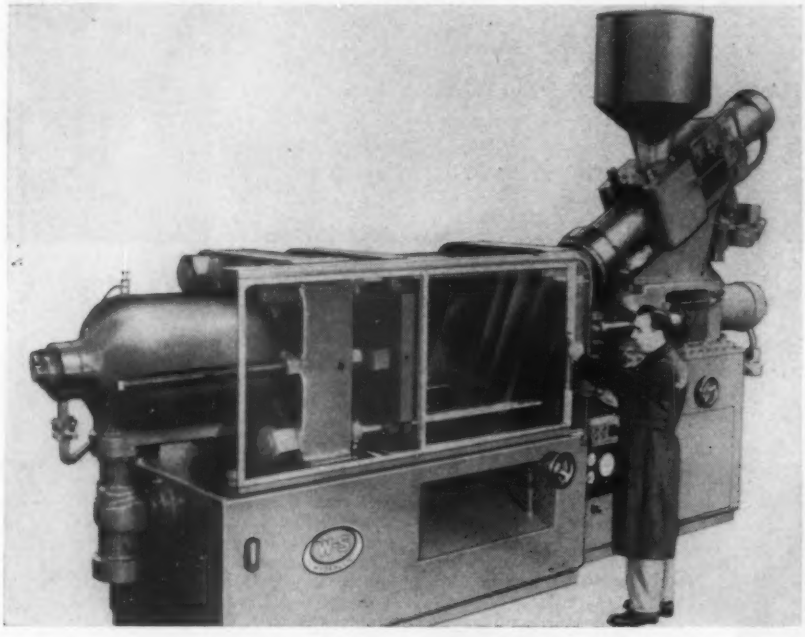
H-P-M Line of High-Pressure Metalforming Presses

Two models (10,800 and 19,500 tons) are currently available in the new line of H-P-M high-pressure metalforming presses. Construction includes a barrel-like steel container with rubber diaphragm and pad. When fluid is pumped into the diaphragm, pressure forces the pad down over the form blocks. After forming, oil is pumped from diaphragm and sliding table containing formed parts is removed from the press.

These new units offer advanced principles for forming titanium and other hard-to-form metals into unusually difficult shapes. The press features two reciprocating tables which operate alternately. They are actuated laterally by a fluid motor drive through a dual chain conveyor to positive stops. When in position, tables are locked by filler plates actuated by double-acting hydraulic cylinder. The table raises and lowers automatically, raising the work to the level of the rubber pad rather than deforming the pad to reach the position of the work. The pad facing is 6 in. thick.

The Diaform presses are completely hydraulic in operation and incorporate a combination high-low pressure system. The smaller of the two models operates at a maximum pressure of 5000 psi, the larger at 6500 psi. The circuit incorporates completely interlocked sequencing.

The Hydraulic Press Mfg Co, Mount Gilead, Ohio



Injection Molding Machine Is Preplasticizing Type

The PE-64 preplasticizing-type injection molding machine, complete with exception of oil and dies, is fully hydraulic, has a 64-oz shot capacity and a 425-ton clamping force. Features include: radial-motor-driven pumping unit, semi-automatic control, rapid operating speeds, adjustable injection speed. Injection and clamping pressures are independently controlled and the internally heated plasticizing cylinder has four-zone temperature control and plasticizing rate of 200 lb of polystyrene per hour. Machine specification include: stroke, 24 in.; daylight opening, 40 in; and hp, 55. The die space is 25x45 in.

The Watson-Stillman Co, Div of H K Porter Co, 109 Aldene Rd, Roselle, NJ

Layout Equipment

A complete line of height blocks and angle plates with heat-treated alloy aluminum bodies and hardened steel tops and bottoms include units which can be used singly or in combination to secure wide range of heights. Shot pins are provided on height blocks for stacking. Six sizes of angle plates range from 24 to 72 in. Jog blocks inside angle plates are provided for slight movement.

Height blocks range in height from 5 to 20 in. in 5-in. increments. They are parallel to $\pm$ 0.005 in. in 12 in. and heights are $\pm$ 0.001 in. within size.

Machine Products Corp, 6771 E McNichols Rd, Detroit 12, Mich

Carbide Grade CY-16 for heavy roughing permits higher feeds and speeds, is reported to give longer continuous cuts at higher tip temperature without tip deformation. Stocked in all standard styles and size blanks and inserts.

Wendt-Sonis Co, Hannibal, Mo

"BIG ROCKER"

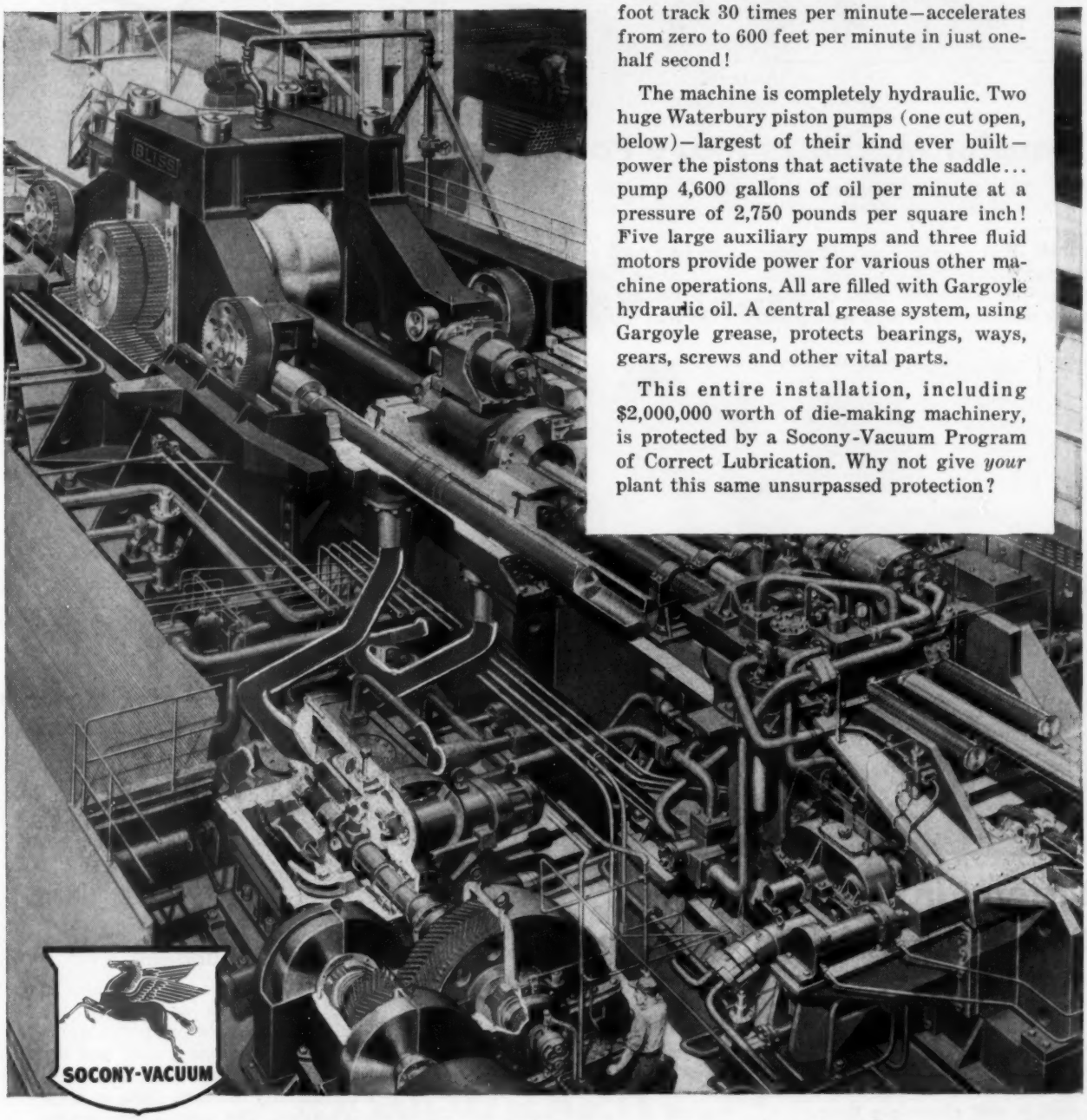
World's Largest Tube Reducing Machine Protected by the World's Greatest Lubrication Knowledge

It's 100 feet long, three stories high, weighs 675 tons! It's the world's largest tube reducing machine, built by E. W. Bliss Co., for the Tube Reducing Corp., Wallington, N. J. This giant takes rough, 18-inch O. D. cold steel tubing and reduces it to between 17- and 9-inch tubing. Finished tolerances are precise.

Heart of the Big Rocker is the "saddle" (top) which holds the huge dies that shape and stretch the tubing. This saddle, weighing 152 tons, rocks back and forth on a six-foot track 30 times per minute—accelerates from zero to 600 feet per minute in just one-half second!

The machine is completely hydraulic. Two huge Waterbury piston pumps (one cut open, below)—largest of their kind ever built—power the pistons that activate the saddle... pump 4,600 gallons of oil per minute at a pressure of 2,750 pounds per square inch! Five large auxiliary pumps and three fluid motors provide power for various other machine operations. All are filled with Gargoyle hydraulic oil. A central grease system, using Gargoyle grease, protects bearings, ways, gears, screws and other vital parts.

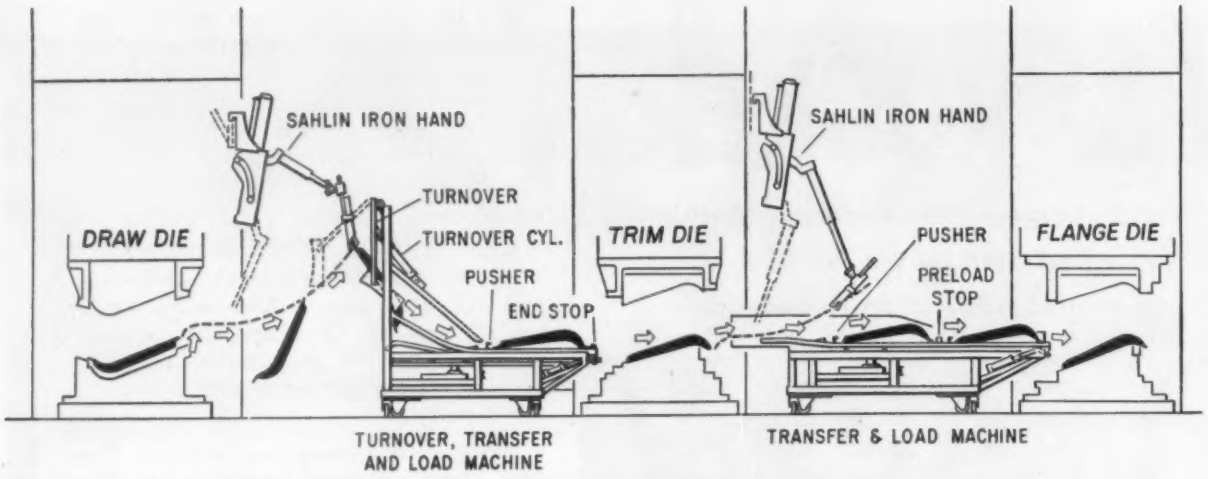
This entire installation, including $2,000,000 worth of die-making machinery, is protected by a Socony-Vacuum Program of Correct Lubrication. Why not give *your* plant this same unsurpassed protection?



SOCONY-VACUUM *Correct Lubrication*

FIRST STEP IN CUTTING COSTS

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION



Transfer Machines Move Panels Between Presses

New automatic transfer machines for high-speed press lines speed up the turnover and transfer of large panels from press to press. Designed for automotive and appliance industries, the machines are complete units with self-contained wiring and piping, and plug-in connections for immediate use upon installation. They operate pneumatically in conjunction with overhead type of iron hand. Once loaded, machine is keyed to unloading of the trim die.

As roof top is removed from trimming press another in the transfer machine preload position loads into the trim die. Simultaneously another panel which is suspended from draw press iron hand is released and slides into vacated preload position. Turnover basket rises immediately into loading position, ready to receive the next panel from draw press.

The machine is synchronized with the presses by a rotary switch on the trimming press. Stamping sizes cover range of large or small panels including hoods, fender skirts, and roof tops. Panels move through machine on their undersides—finished surfaces are not touched.

Sahlin Engineering Co, Birmingham, Mich

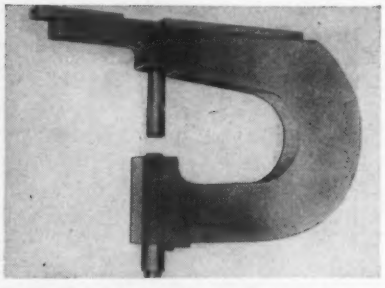
Piston Pin Gage Measures, Sorts By Multiple Standards

Automatic multiple-action electronic sorting gage measures the hardness, over-all length, triangular out-of-round, OD, and taper of automotive piston pins and sorts them into ten size categories. Gaging and sorting speed is 4000 pieces per hour.

The gage is designed for either conveyor or manual feed and disposal. From the magazine feed chute the pins roll into a four-cup index heel and are carried to hardness station. At this station parts are also measured for over-all length by a Federal Electricator. Reject signals set a mechanical memory for later disposal. Subsequent stations repeat the process for the other standards, the final station measuring taper using the diameter gaging unit for a reference position.

Electrical operation and recycling is controlled automatically by switches actuated by timing cams.

Federal Products Corp, 1144 Eddy St, Providence, RI



Unit Pierces Holes In Aluminum Extrusions

Units designed for piercing holes in aluminum extrusions feature the Toolset top and bottom punch guide claimed to increase punch and die life. Another feature is the interchangeability of many parts in various models. The units allow punching holes up to 5/16-in.-dia and ¾-in. centers. They are supplied in high and low shut heights in fixed or adjustable-position mountings.

Toolset Div, General Riveters, Inc, 785 Hertel Ave, Buffalo 7, NY

Welding builds it faster, lighter and safer...

and RADIOGRAPHY checks each weld.

It swims. It climbs. It fights. It's tough and strong. For, from stem to stern, this L. V. T. is welded.

Welding saves precious weight and countless man-hours in construction. It avoids the rivets and bolts which become as lethal as shell fragments under shock.

With Radiography checking for soundness, welding continually finds new work to do—solves problems that would make jobs like this L. V. T. virtually impossible.

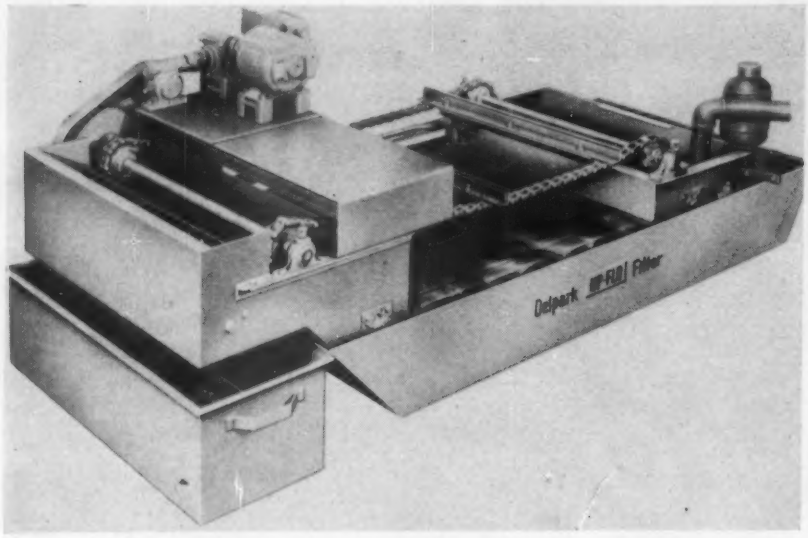
So weld shops, with small operations or large, are finding radiography valuable both for building reputations for good work and for expanding into new fields. If you would like to explore how Radiography can help you increase your business, get in touch with your x-ray dealer. He'll gladly talk it over.

RADIOGRAPHY

... another important example of photography at work

Kodak

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N.Y.



Delpark Up-Flo Filter Uses Permanent Media

The Delpark Up-Flo filter uses gravity to remove the heavier solids before filtration of the liquid through a horizontal bar screen. Only the fine particles held in suspension reach the screen. Chain-driven flights operating on time lapse sequence pass under filter and remove deposits from underside of screen and area beneath the screen. These flights carry the particles to a device which cleans the flights. Filtered swarf drops into a tote box for disposal.

Industrial Filtration Co, Dept U-287, Lebanon, Ind

Walker-Turner Air Feed Unit for Drillpresses

Air feed is said to fit head of any W-T type drillpress up to 6-in. spindle travel. It is claimed that it can be installed in 10 min without need for machining or making electrical connections. The unit contains no hydraulic components and its pneumatic micro-valve imparts to the spindle sensitive automatic feed and retard action for a variety of continuous production operations. A hydraulic check valve is available as an accessory.

By means of check valve and series of setscrew adjustments rate of feed may be controlled to fit job at hand. Release of a valve stop reverts the air feed to single cycle operation and removal of two plugs from air cylinder head converts it for hand operation. The manufacturer claims the accuracy of feed will hold indefinitely within 0.003 in.

Feed pressure at drill point averages 14 times greater than air pressure. Price for complete unit including motor starts at $344.

Walker-Turner Div, Kearney & Trecker Corp, Plainfield, NJ

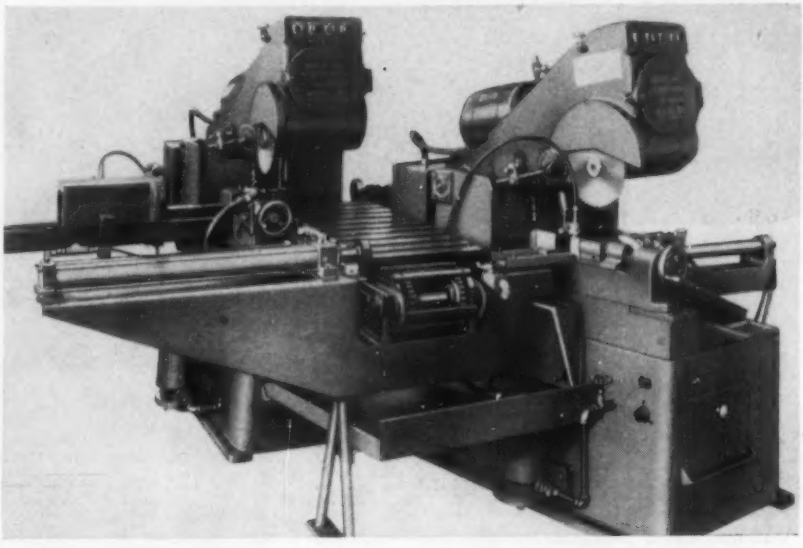
Power Feed Unit Has Mechanical Drive

Cam-controlled automatic feed cycles are provided by this self-contained mechanical unit. The cam drive affords positive feed control; infinite variations in feed cycles is possible by changing cams.

The basic unit is for application where tooling is provided by user. It consists of compact housing, cam feed mechanism, drive motor, and slide assembly. The machined slide provides a maximum stroke of 2 in., is 4 in. wide, and moves on dovetail ways. Gibs with adjusting screws are provided for regulating the clearance. A gearmotor rotates the cam which regulates feed cycle of slide, delivering a torque of 52 in.-lb.

The complete unit consists of the basic unit and ball-bearing spindle, mounting bracket, and spindle drive motor. Spindles are available in three types: collet, Morse Taper, and arbor type for cutters with 0.375 or 0.500-in. center hole. A 1/6-hp drive motor is mounted on the slide with an adjustable V-belt drive.

Russell T. Gilman, Inc, 2410 N Farwell Ave, Milwaukee 11, Wis



Two Standard Machines Do Special Job

Model OOG automatic circular sawing machines were combined in dual fashion to cut from stock a piece 2⅝ in. in length with a right-angle cut on one end and a 15° angular cut on the opposite end. Machine in rear cuts piece twice finished length to provide square ends. Chain-operated conveyor indexes cut piece to second loading station on machine in front. This machine is positioned at 15° angle and is equipped with angular jaws on double-acting vise which holds double-length piece. By cutting piece in half, desired end result is obtained.

Stock is fed automatically to each machine. A stock stop actuates the vise when stock is pushed against it. Sawing cycle begins as soon as vise has clamped stock. At 100% efficiency, 89 cuts per hour are possible, in this case on C-1118 hot rolled steel 1½ x 2⅝ in.

The Motch & Merryweather Machinery Co, 888 East 70th St, Cleveland 3, Ohio

BIG HOBBERS for ILLINOIS GEAR

This mammoth new gear hobbing machine, now in operation at Illinois Gear, is the most accurate and largest machine in existence for fast precision hobbing of BIG gears. Equipped with 12" x 15" ground hobs, the largest ever made, it does precision work on blanks up to 100,000 lbs. and 134 inch diameter, 3½ inch C.P. and 54 inch face. Spur, helical and worm gears can be cut to spacing tolerances as low as .0003 inch.

Whatever your needs, you'll find the right machine and tool for your job at Illinois Gear.

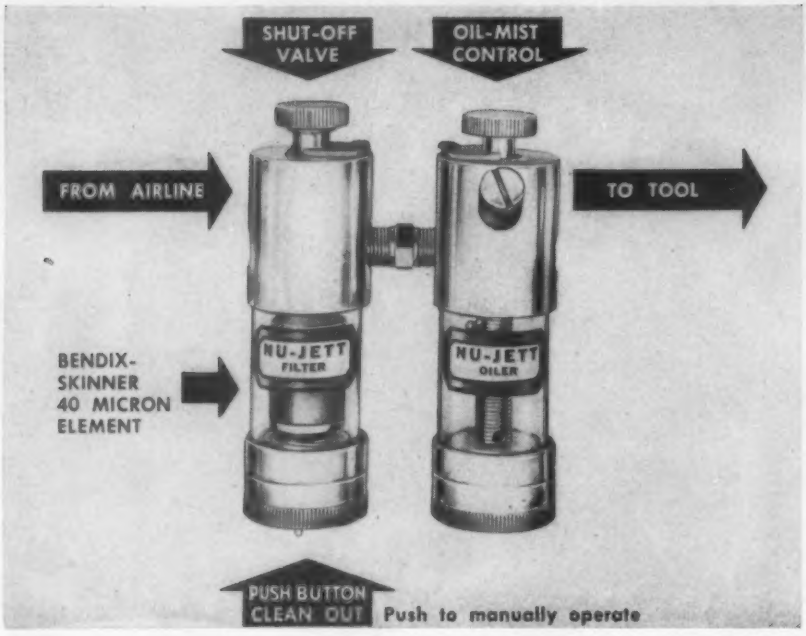
Look for this mark (ILLG) . . . the symbol on finer gears

ILLINOIS GEARS Reg U S Pat Off

Gears for Every Purpose ... one gear or 10,000 or more

ILLINOIS GEAR & MACHINE COMPANY

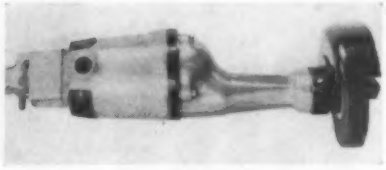
2108 NORTH NATCHEZ AVENUE • CHICAGO 35, ILLINOIS



Nu-Jett Filter and Lubricator For Air Cylinders and Tools

Nu-Jett unit is installed directly ahead of pneumatic equipment it protects. The permanent filter has a Bendix-Skinner 40-micron element. The lubricator is adjustable to meet the exact requirements of the individual unit it serves. Should the primary lubricating means through an oil wick be interrupted, a standby means of syphoning automatically takes over. Air velocity at any setting is unaffected. Units are $12.50.

Nu-Jett Products Corp, 1355 Michigan Ave, NE, Grand Rapids, Mich



Portable Grinder

Black & Decker has announced a new 6-in. portable grinder whose power has been upped 85% over that of previous model, and total weight reduced 1½ lb. The unit incorporates lubricant - sealed ball bearings and is designed for continuous duty. Its heat-treated helical gears give smoother and more efficient transmission of power. Centrifugal fan produces extreme air velocity to commutator section and keeps motor free of abrasive dust and carbon. Exhaust air is directed away from operator.

The grinder measures 24½ in. over-all, weighs 18¼ lb net and has spindle speed of 3750 rpm. Tool is available for 115- or 220-v ac or dc operation.

Black & Decker Mfg Co, Towson 4, Maryland

Vertical Boring, Turning Mill Does Roughing and Finishing

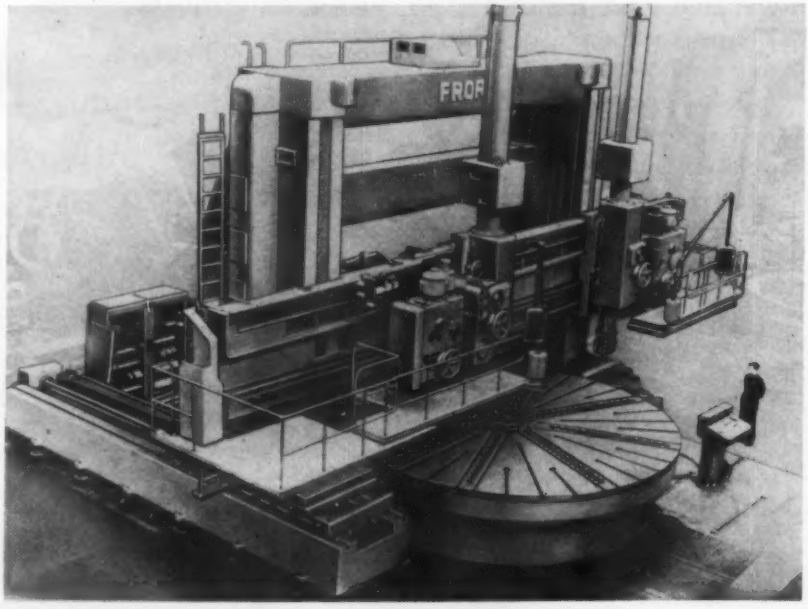
Froriep double-column vertical boring and turning extension mills are manufactured in standard sizes from 80-in. table diameter to 32 ft with work load capacities from 6 to 160 tons. It is reported that the machines have been built with well-dimensioned component members to allow maximum cutting forces to be applied consistent with highest efficiency in cutting speeds and feeds.

Feed to the vertical ram is through electrical transmission to receiving motors on the saddles. Horizontal feed is through helical pinion to a rack mounted on the crossrail. Thread-cutting is provided through change gears coordinated with synchronized electrical transmission. Main drive is by direct-coupled, variable-speed dc motor in connection with Ward-Leonard converter.

The table rotates on a large flat bearing with hardened and ground steel ring fastened to under side of table and running on high-grade white metal bearing in the base. Table spindle is housed centrally in adjustable roller bearings. Machines are built with either single or double pinion drive.

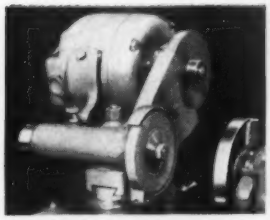
Driving shafts are journalled in anti-friction bearings. All gears are of large dimension with helical teeth and hardened and ground (with exception of large table gear). Lubrication control is automatic. Speed range ratio is 1:100.

Imported by Cosa Corp, Chrysler Bldg, New York

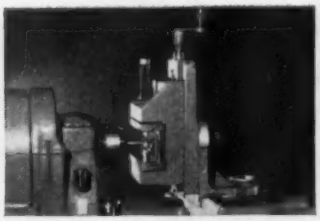


Straightening machine, variable speed Model 208, for ferrous and nonferrous stock, has 17 power-driven rolls. Coil stock capacity (steel) is minimum thickness 0.010 x 8 in., maximum 0.025 x 8 in., or 0.040 x 4 in. Parts capacity is maximum thickness 3/32 x 1 in. wide.

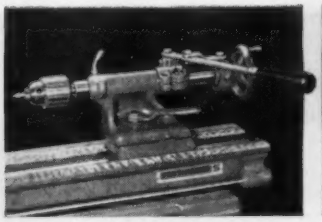
F J Littell Machine Co, 4127 N Ravenswood Ave, Chicago 13, Ill



External Grinder

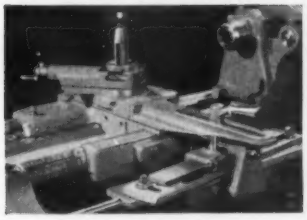


Milling Attachment



Handlever Tailstock

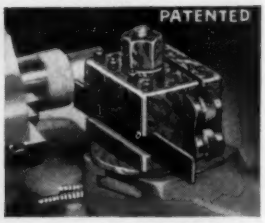
Handlever Bed Turret



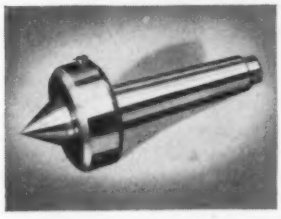
Telescopic Taper Attachment

Handwheel Collet Attachment

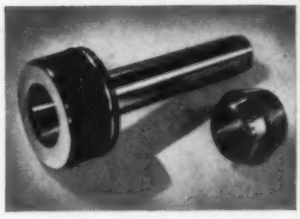
Handlever Collet Attachment



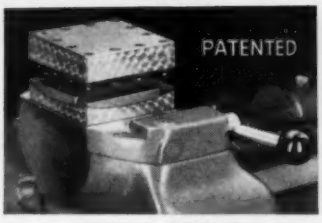
10 in 1 Tool Holder



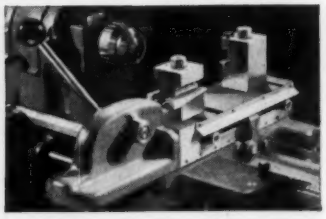
Ball Bearing Live Center



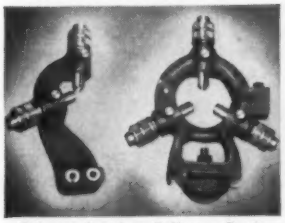
Adjustable Collet Bushing Chuck



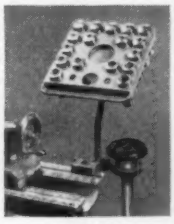
Square Turret Tool Block



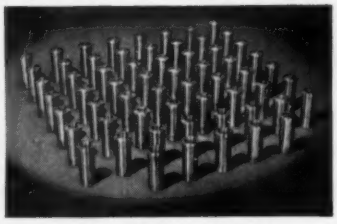
Handlever Double Tool Cross Slide



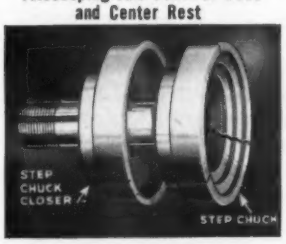
Telescoping Jaw Follower Rest and Center Rest



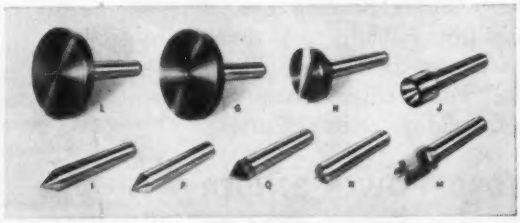
Collet Rack



Steel and Brass Collets

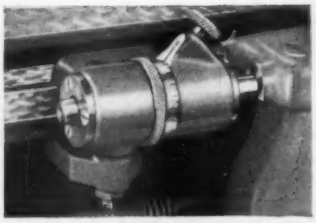


Step Chucks and Closers

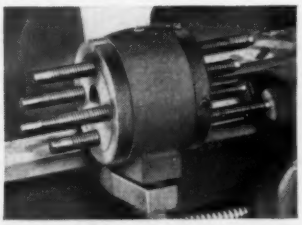


Centers and Drill Pads

Thread Dial Indicator



Micrometer Carriage Stop



Four Position Carriage Stop

SOUTH BEND

Lathe Attachments

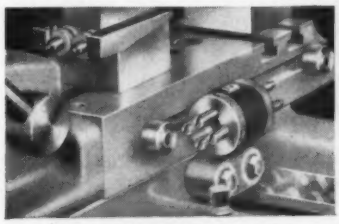
- Cut Production Time
- Simplify Difficult Jobs
- Increase Lathe Versatility
- Speed Up Tooling
- Perform Special Classes of Work
- Reduce Operator Fatigue

Write for Catalog

SOUTH BEND LATHE

Building Better Tools Since 1906

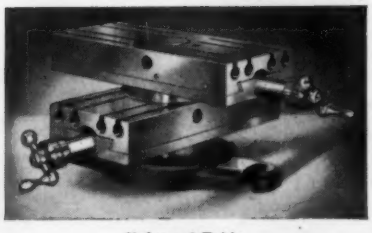
SOUTH BEND 22,
INDIANA



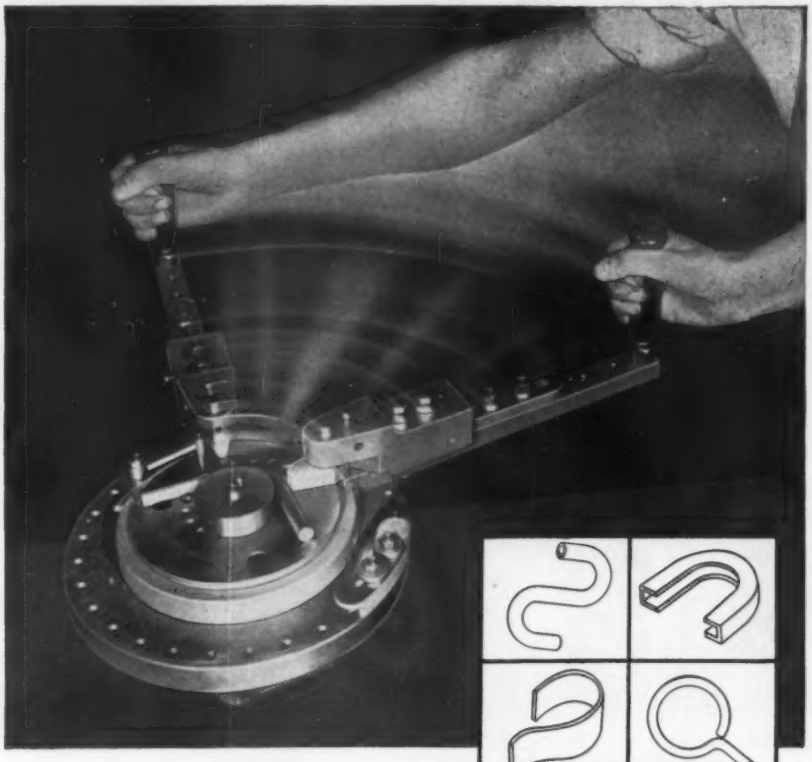
Four Position Cross Slide Stop

Safety and Standard Lathe Dogs

Coolant Pump



Universal Table



Bend a Variety of Materials

Accurately, Easily, Quickly with a DI-ACRO* BENDER

Simple and complex bends can be formed and duplicated in many ductile materials with a versatile Di-Acro Bender. Bending capacity of the five hand operated models ranges from 1/16" wire to 1" round mild steel bar. Many accessories are available for bending various materials and shapes. The Di-Acro Bender can be delivered completely tooled for most forming requirements in solid materials and tubing.

DI-ACRO HYDRA-POWER BENDER

A universal hydraulically operated bending machine that is equally as flexible as hand operated machine. Di-Acro Hydra-Power Benders are especially designed for those long runs and heavy bending operations which are impractical for manually operated equipment.

*Pronounced Die-ack-ro.

WANT MORE INFORMATION? *Send for New 32-Page Catalog*

Gives complete details on hand and power operated Di-Acro Benders, Brakes, Notchers, Punch Presses, Rod Parters, Rollers, Shears, Spring Winders and Press Brakes. Send for your copy today—there's no obligation.

Creators of **"DIE-LESS DUPLICATING"**

See Di-Acro Exhibit Booth 718, Western Metals Congress, Los Angeles, March 28-April 1.

O'NEIL-IRWIN MANUFACTURING CO.
405 8th Avenue • Lake City, Minn.

di-acro PRECISION METALWORKING MACHINES

ROUND TABLE Discussion

OUT THE BACK DOOR

Is there any solution to the increasingly common 65-year-old retirement age? Can men be acclimated to accept this ultimatium as they accept death and taxes? Should exceptions ever be made?

IN MY OPINION, forced retirement at 65 is not a good practice. Each company should judge each case individually.

It is true that many pension plans now in operation specify compulsory retirement at 65. But all employees should not be required to retire at a specified chronological age in order to receive their pensions. Nor should such a requirement be enforced even if no pensions are available.

One argument advanced in favor of compulsory retirement insists that it is necessary in order to make way, for younger men. If making way means the provision of employment opportunities, then this argument is distinctly questionable, since no continuous or increasingly serious shortage of jobs has yet become apparent.

Again, the view is widely held that retirement is necessary to allow younger persons to assume control. However, policy determination and administration has long been a function of mature oldsters. Those who favor compulsory retirement argue that younger, less-fixed viewpoints are essential to progress, and that business and public operations are likely to be handicapped by both physical defects and mental rigiditics of older leaders and managers. I do not agree with this premise. My industrial experience has demonstrated that chronological age is not the proper yardstick to measure ability.

Proponents of enforced retirement also insist that in the absence of a fixed and arbitrary rule, older employees will be retained, whether or not they are able to perform their jobs. They dare not allow decisions on retirement to be handled on a case-by-case basis, because they feel that only an absolute rule will prevent the retention of numerous older, inefficient employees and executives.

No policy can be sound if based on such an erroneous proposition as the conclusion that all persons are alike at any specified chronological age. From personal experience with

FULLER BRUSH SETS THE PACE

with Improved Power Brush Machines

Send coupon below for literature on New Machine

Make Use of FULLER BRUSH Engineering Service

NEW set-up opportunities, increasing production, are offered by the advanced design of this new Fuller Brushing Lathe and "universal" Work-piece Holder.

The lathe introduces a reversing spindle, which provides in the same cycle, a time-saving, two-directional brush attack. Also, 4 choices of power and a variable speed drive permit coordination of speeds to worn or small brush diameters — for maximum removal consistent with desired finish. Both off-hand and power manipulated applications can be arranged.

With the "universal" Work-piece Holder set-ups are given the most efficient position — vertical, horizontal, radial, angular or longitudinal — with power manipulation and reversing action. When desired this machinery can be equipped with controls for quality protection and for automatic cycling on production runs.

In addition to this new metalworking machinery, Fuller Brush has for many years engineered and built special brush machines for all industries. This experience is available for help on your unusual problems.

FULLANCHOR Super-Balance WHEEL BRUSHES ... reduce vibration, improve work-piece finish, decrease brush wear ... because brush filaments are precision-spaced for precision-balance.

FULLER BRUSH

MAIL COUPON TODAY!

BONUS OFFER

We will give you, ABSOLUTELY FREE, this handy, time-saving slide chart that gives wheel brush specifications with a flip of the wrist ... when you send the coupon for help with your brushing problems.

The Fuller Brush Co.
3666 Main St.
Hartford 15, Conn.

Please send me your Free Wheel Brush Selector and your literature on NEW Brush Machine. Some of our problems are checked at the right.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

CHECK

- ____ Deburring broached parts
- ____ Deburring gear teeth
- ____ Deburring threads
- ____ Satin finish
- ____ Excess solder
- ____ Plastic flash
- ____ Blending pits and scratches
- ____ Surface uniformity
- ____ Polishing
- ____ (Other)_____

NOW...
WITH ONE MACHINE
YOU CAN SELECT
the ideal arc
AC or DC
for every job with
LINCOLN
IDEALARC®

4 types of arc at your fingertips

★ AC SOFT ARC

★ AC FORCEFUL ARC

★ DC SOFT ARC

★ DC FORCEFUL ARC

TO THE MAN WHO USES AC

For the first time . . . an AC welder with truly stable arc —*plus* choice of soft arc for smooth, clean welds; forceful arc for maximum in penetration and non-sticking operation.

TO THE MAN WHO USES DC

For the first time . . . a heavy duty, dependable DC welder that combines the efficiency of the rectifier with versatility of selecting a soft and forceful arc. *Then you can switch to AC instantly, where the job can be done better with AC.*

TO THE MAN WHO USES BOTH AC AND DC

For the first time . . . in *one* machine, both AC and DC with selection of soft arc or forceful arc in either AC or DC. Gives you the ultimate in speed, ease, low cost.

START CUTTING COSTS . . . NOW!

Send for Bulletin 1343 showing how hand welding can be simplified, done faster, for lower cost. Write.

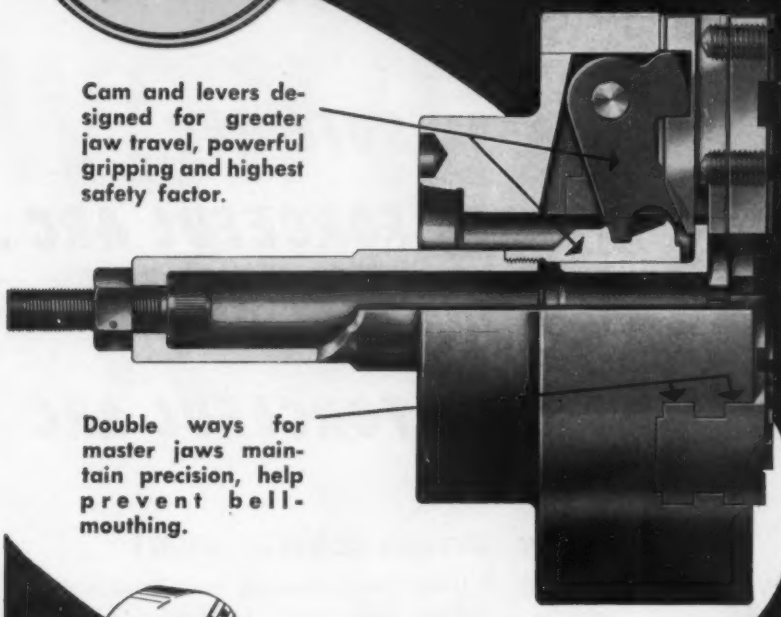
GET THE FACTS
SEND FOR BULLETIN 1343

THE LINCOLN ELECTRIC COMPANY

Dept. 2001 • Cleveland 17, Ohio

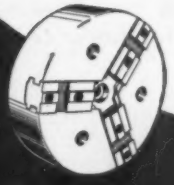
The World's Largest Manufacturer of Arc Welding Equipment

POWER CHUCKS



Cam and levers designed for greater jaw travel, powerful gripping and highest safety factor.

Double ways for master jaws maintain precision, help prevent bell-mouthing.



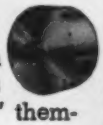
More gripping power

Famous S-P cam and lever design holds the work tighter, permits cost-cutting heavy feeds and multiple cuts. Cam and lever design also resists opening of jaws by centrifugal force or diminishing air pressure . . . an important safety factor.

Installed as original equipment by Bardons & Oliver, Cleveland Automatic, Cone Automatic, Ex-Cell-O, Monarch, Warner & Swasey . . . many others.

Representatives in principal cities. Prompt deliveries. Send for Catalog 105. The S-P Manufacturing Corp., 12415 Euclid Ave., Cleveland 6, Ohio.

S-P ROTATING AIR CYLINDERS



Piston packings "replace" themselves, cut downtime. Send for Catalog 105.

THE S-P MFG. CORP. — Cleveland
A Bassett Company
PRECISION PRODUCTS SINCE 1916

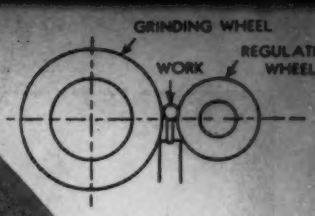
AIR AND HYDRAULIC CYLINDERS • POWER CHUCKS • ROTATING AIR CYLINDERS
COLLET AND DRILL PRESS CHUCKS • AIR PISTONS, VALVES AND ACCESSORIES

retired workers I know of the hardships imposed by enforced retirement on persons who are physically and mentally sound. Furthermore, I am against paying pensions to persons who are entirely capable of earning their own support.

In view of the important social and individual costs of pensions and retirement and the personal problems frequently involved, attention has recently been focused on possible arrangements that insure the benefits of retirement but avoid some of its costs. In essence, such arrangements seek to assure that older persons will not retain control of policy-making functions or hold jobs which they cannot perform efficiently, but will be permitted to work as long as use can be made of the services they can perform. Specific policies and programs designed to attain these results vary. For officers and management personnel, some companies set a retirement age, after which employment is optional. If the retiring individual is able to continue work, he may be rehired on either a part or full-time basis. He will, however, generally be relieved of any managerial responsibility. He will not usually receive his pension during continued employment, although there are exceptions to this rule. Non-managerial employees may be offered a similar option. They may be reemployed after they reach retirement age in whatever jobs are suitable. Reemployment is usually in lieu of pensions, which will be paid whenever no further employment is possible.

However, in many present-day industrial operations the primary requirements for the majority of workers are speed, and physical and nervous stamina, rather than long experience at the task. The emphasis is, therefore, on youth and, as a

"You'll make a foreman yet, Burgess—the men are beginning to dislike you."



Pays off in Performance

SURVEY

DESCRIPTION OF WORK

Thru-feed centerless grinding piston pins—.500 to 1.000 dia. Stock removal .010 to .012 Comm'l finish.

WHEEL

Simonds Centerless grinding wheel 20 x 6 x 12 A60-L65-V1

PERFORMANCE

Consistently gave 80 hours of life. This is *double the life of competitive wheel previously used.*

SIMONDS ABRASIVE CO.

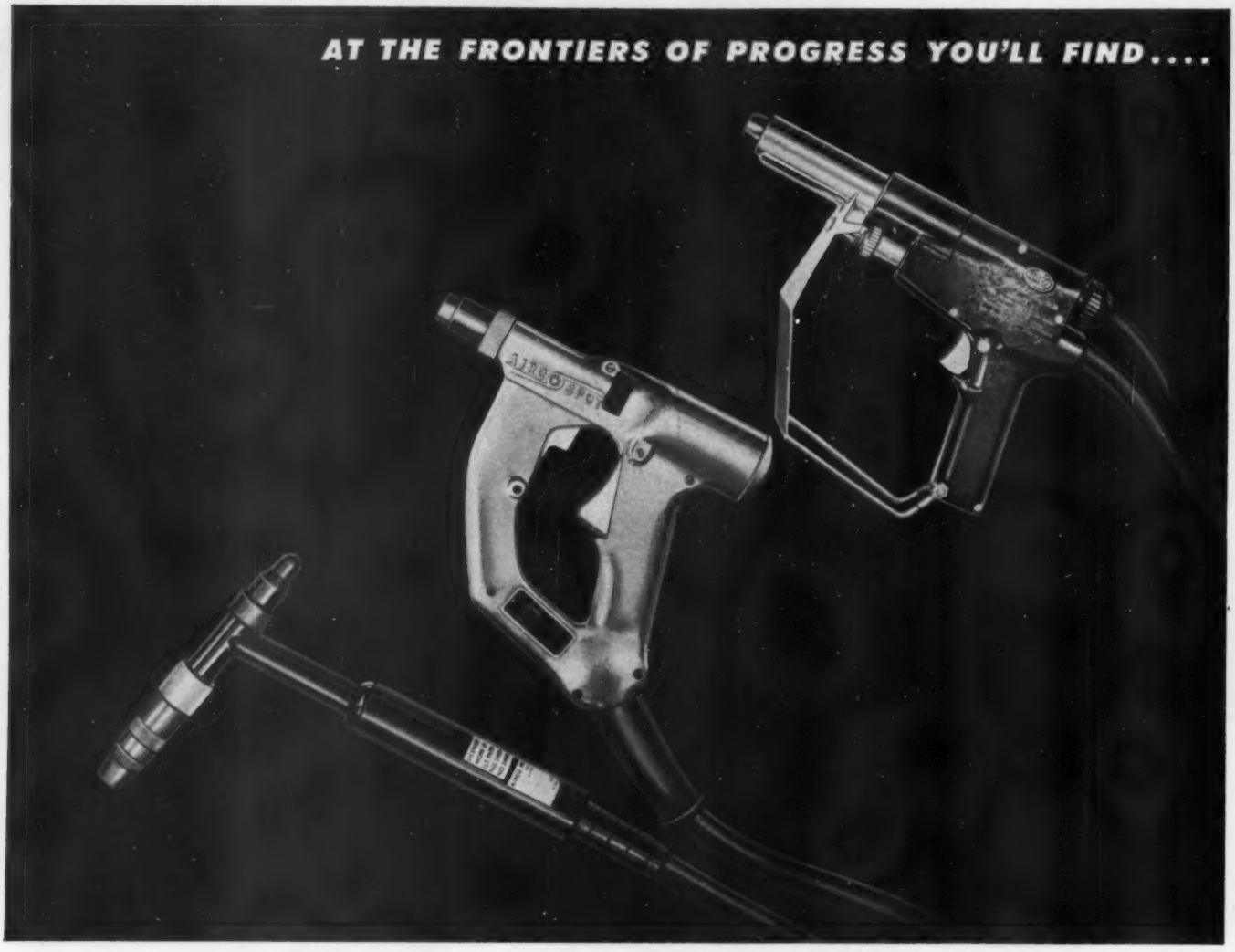
CENTERLESS GRINDING WHEELS

Field Surveys repeatedly prove the high performance of these wheels. They cut free, hold their shapes to give fast, top volume production. Write for bulletin ESA 55.

SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.

Branch Warehouses: Boston, Detroit, Chicago, Portland, San Francisco • Distributors in Principal Cities
Division of Simonds Saw and Steel Co., Fitchburg, Mass. • Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y., Simonds Canada Saw Co., Ltd., Montreal, Quebec, Lion Grinding Wheels Div., Brockville, Ont. and Simonds Canada Abrasive Co., Ltd., Arvida, Quebec

EXTRA SAVINGS FROM YOUR SIMONDS DISTRIBUTOR
STOCK · SERVICE KNOW-HOW



Get Airco Inert-Gas Welding into your Production Picture!

Lower costs through quality and speed . . . that's Airco's answer to your production problem – even when the materials include aluminum, bronze, copper, nickel, stainless steel . . . all engineering metals.

The Aircomatic welding unit, for example, was researched and designed by Airco to produce top-quality welds . . . especially in "problem" metals and alloys without flux . . . with minimum plate edge preparation and little or no preheat. In performance, Airco's Heliwelding is similar – though engineered for high-speed welding of *thin* sections of metals – any metals.

And with the newest Airco addition to inert-gas-shielded welding, Aircospot, you can weld from one side of the joint – eliminating jigs and backup plates. Aircospot is the perfect primary tool for fabrication and no finer cost-saving tool for tack welding has ever been devised.

You'll want to learn more about how Air Reduction's inert-gas-shielded arc welding processes can serve you. Contact your nearby Airco Representative, Authorized Airco Dealer – or write Airco direct.

WELDING SHOW **VISIT BOOTH 254**

AIRCO®

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated, with offices and dealers in most principal cities

Air Reduction Sales Company
Air Reduction Pacific Company

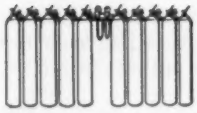
Represented internationally by Airco Company International

Foreign Subsidiaries:
Air Reduction Canada Limited,
Cuban Air Products Corporation

Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide, liquid-solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl acetates, alcohols and other synthetic resins.

AN AIR REDUCTION PRODUCT

AIRCO items for inert-gas-shielded arc welding



Air Reduction is your preferred source for the shielding gases you need. Argon, helium, or a mixture of gases are employed for Aircomatic, Heliwelding, and Aircospot. Airco supplies them all. Prompt bulk delivery, as well as by the cylinder, are obtainable.

Consult your Airco District Office for specific information concerning gas mixtures and recommendations based on the type of work you are doing.

Airco supplies a complete range of tungsten electrodes for AC and DC Heliwelding. Electrodes are available in pure tungsten, thoriated tungsten, (Thor-Tung) and zirconium tungsten. All three types are offered in seven diameters from .040″ to ½″ and in four lengths from 3″ to 18″. Other lengths of all electrodes on special order.

Aircomatic-Heliweld filler wire is processed to conform to the highest standards for surface finish, cast and cleanliness. Its use assures smooth, uninterrupted wire feed. Specifically designed for use in the Aircomatic manual and automatic head, and the Heliweld filler wire feeder. *Write for literature on these items.*

person begins to slow up in his mental and physical reactions, he may become less effiicient and a less desirable employee. At the same time, the worker often does not realize, or will not admit, even to himself, that he is less active than formerly and refuses to consider that he is approaching retirement. He plans to continue indefinitely on the job and will make no plans for his own self-support on a reduced income or for the utilization of his newly-acquired leisure time. Retirement strikes him suddenly as an accomplished fact and, in many cases, he cannot face the reality of the situation and suffers a complete emotional breakdown. Employers should, therefore, be obliged to plan on behalf of the aging individual employee, for his support and his emotional adjustment to his new status.

Management recognizes the need for younger men in business and industry, and also realizes that the rapidity with which these younger men reach the actual productive stage is due entirely to the character and ability of the older men who train them. Many organizations have followed the practice of retaining older, seasoned men for training purposes. Their directors realize the value of these older men, and know that youngsters will accept their instructions more readily than they would accept the teachings of a young theorist. Yet even with the best training in the world, there is a big gap between the beginning of the working period and the actual productive stage. This training period is costly, and it would be uneconomical for management if it made no special provision for it. What better way of taking care of the important training of younger men could be devised than the utilization of the specialized experience of the older men?

Another way of handling the problem of the worker who has reached the slowdown stage of his career, and we all get there in time, is to put all the jobs in the place which might be handled by men of this type in charge of a special personnel officer. Other jobs of the same sort can be created. Special care, however, should be taken to pick out jobs in which men feel the pride of craftsmanship.

The advantages of individual consideration of each worker who reaches 65 should be apparent. This man will usually have plenty of experience and mature judgment upon which to draw in these competitive times to keep on with his good work for the company. He will not need the training that newer and younger employees will require. He is more resourceful than a newer employee, and won't watch the clock. He is likely to be more reliable and steady than a younger man. Of course he does not have the potential for future years that the young man has. But for the immediate present, and for a limited period ahead, he may be just what the company needs. This does not imply that younger men are not necessary for the success of a company. But along with these men of younger years a company should have a liberal sprinkling of seasoned older men who have the experience, resourcefulness and reliability that spells success in any enterprise.

Men age at a different pace. If a man is disabled by sickness or injury he must stop working whether he is 30 or 80 years old. If he is weak, or incapable of performing certain tasks, he should be trained for less-exacting work. It has been found that people who retire from lifelong working habits die sooner. The neces-

THREAD ROLLING DIES

by

PRATT & WHITNEY

for clean · smooth · accurate threads

DUPLEX* DIES . . . for WATERBURY-FARRELL, MANVILLE and HARTFORD SPECIAL MACHINES
*Double faced for longer life

SINGLE FACE DIES . . . for NATIONAL BOLTMAKER MACHINES

CIRCULAR THREAD ROLLING DIES . . . for REED MACHINES

SPECIAL CIRCULAR THREAD ROLLS . . . for AUTOMATIC SCREW MACHINE APPLICATIONS

DUPLEX* SPECIAL KNURLING DIES
*Double faced for longer life

For greater die life; longer production runs without interruption; and consistently more accurate, more uniform bolts, screws, studs and similar threaded parts . . . choose P&W Thread Rolling dies. Made of special analysis high-alloy tool steel, and milled with properly compensated precision thread hobs, these dies produce American National or Unified Threads in materials ranging from nonferrous metals to tough alloy steels.

FOR MORE COMPLETE INFORMATION, ASK THE PRATT & WHITNEY BRANCH OFFICE NEAREST YOU, OR WRITE DIRECT TO WEST HARTFORD.

PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.
SINCE 1860

First Choice for Accuracy

BRANCH OFFICES AND STOCK . . . BIRMINGHAM • BOSTON • CHICAGO
CINCINNATI • CLEVELAND • DALLAS (The Stanco Co.) • DETROIT • LOS ANGELES
HOUSTON (The Stanco Co.) • NEW YORK • PHILADELPHIA • PITTSBURGH
ROCHESTER • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., WEST HARTFORD

MACHINE TOOLS • CUTTING TOOLS • GAGES

sity may arise at any age to give up work which overstrains our physical or mental abilities. But the number of our years ought to be irrelevant. As long as a man enjoys good health and the desire to work he should be provided with the mental and physical activities necessary to carry out his desire.

Harry Kaufman
Philadelphia, Pa

THE CONSENSUS OF OPINION of industry seems to be that a person 65 years old is no longer able to cope with his job.

Many men are old at 50; others are comparatively young at 70, but most firms cannot see this difference, or are not interested in the individual, and a rule is a rule regardless of a man's ability to do a good day's work.

I have never heard a gripe from the union about keeping a man on as long as we saw fit; trouble from this quarter seems definitely out.

We all know that the average pension plan in industry provides only peanuts. A man could not get along on the pensions paid plus the social security allowance—at least they would have to scrimp to make both ends meet unless they had saved a fair amount of money during their productive years. Many persons could not save much, however, due to illness in the family, or the money is needed to raise large families.

There are some companies, however, who do not release a worker unless he asks for it, or is known to be definitely ill. I recall a case of a foreman in one of our local plants who had to fight to be retired at the age of 84. This is of course an extreme case, but it shows that some men are of definite value regardless of age, health being considered.

Personally I think that the hard and fast rule of retiring workers at a stated age is not fair to the worker nor to their own managements.

Wm C Betz
New Britain, Conn

IS IT POSSIBLE for us to set up an arbitrary standard based merely on age? I think not—many of us are old at 45, others seem to be young at 70. Is age the only factor, or must we take into consideration a person's health, his mental alertness, his need for money, and so on? It seems to me that these factors are as important and necessary of consideration as is that of age.

If a man at 65—the usual retirement age—is as completely mentally keen and as active physically, he is

probably the exception rather than the rule. Can a company afford to take care of these exceptions? Perhaps a solution would be to place such a worker on a less technical job, one which does not require the close concentration, the quick decisions that a younger man can make more easily. But here again . . . is reaching a 65th birthday to be the sole point of decision? Certainly no person physically changes on the eve of his birthday. The various slowing up processes have been happening over the weeks, the months and even the years. A wisely organized company will watch for such signs and remove the employee from dangerous responsibility insofar as his fellow workers are concerned, when the danger point is reached, but not necessarily on the eve of his retirement.

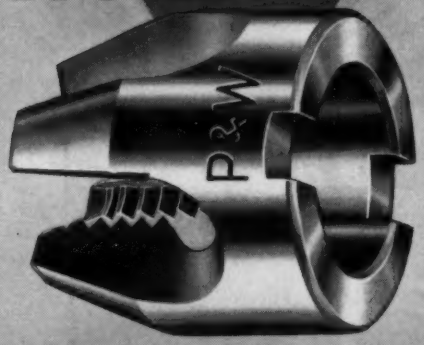
The increasing of the use of industrial pension plans and other types of retirement funds is a partial solution to the argument regarding the need for money.

Frequently the most serious problem is the type of industrial worker who is ambitious, conscientious, and active—the man, who at 65 is not quite so capable as he was at 55 or even at 60, but who is far from being a "has-been." He is capable of doing a day's work efficiently at a moderate pace and of turning out work that will pass inspection. It is this type of worker who enjoys his job, and would be lost without it, that is the serious problem for a company.

Some companies have established research divisions, workshops of one kind or another. But not all persons enjoy this type of puttering around and it is not a complete solution.

It seems to me that the community itself has a responsibility here. Aren't there some minor civic or community

YOU CAN PRODUCE THREADS
"TRUE AS A DIE"
WITH
MONOCONE DIES



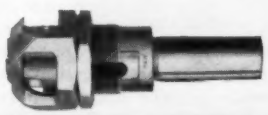
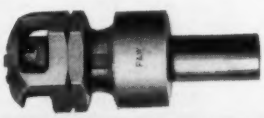
DESIGNED FOR USE WITH ALL STANDARD HOLDERS USING A FLAT LOCATING SURFACE AND SQUARE KEYWAY DRIVE

Having trouble cutting threads that will meet gage inspection? Try Pratt & Whitney Monocone Dies; get clean, uniform, accurate threads at lower cost. You can be sure that every Monocone Die is right, because they're all individually performance tested for cutting action, finish and accuracy of thread produced. Every Die is sent out with its test piece which has passed close gage inspection.

- PRECISION GROUND ON FACE . . . with the correct rake
- PRECISION GROUND CHAMFER . . . for clean, smooth cutting action.
- GROUND THREAD HOBS . . . used to insure thread accuracy
- CAREFULLY SELECTED STEELS . . . carbon or high speed, expertly heat treated for maximum toughness and wear life.

AVAILABLE IMMEDIATELY FROM STOCK AT STANDARD PRICES

Also Available — P&W MONOCONE DIE HOLDERS

REVERSING DIE HOLDER — SOLID DIE HOLDER

First Choice for Accuracy

Send For Complete Data

PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
Charter Oak Blvd., West Hartford, Connecticut

Please send my free copy of Circular No. 546.

NAME_____
TITLE_____
COMPANY_____
CO. ADDRESS_____
CITY_____ ZONE____ STATE_____

MACHINE TOOLS • CUTTING TOOLS • GAGES

PEARLITIC MALLEABLE CASTINGS

when operating conditions . . .

. . . are severe

If service conditions are unusually rugged and you're troubled by high manufacturing costs—look to pearlitic malleable castings!

Pearlitic malleable has high fluidity that casts easily into complicated shapes. It resists wear under heavy loads at high speeds . . . has high ultimate strength . . . possesses excellent non-seizing properties for bearing surfaces . . . can be given a very smooth finish where desired . . . and can be either liquid quenched or air quenched. And perhaps *most important of all, pearlitic malleable machinability index ranges from 80 to 90* (B1112 steel = 100).

So look your product over critically. Then check pearlitic malleable castings. They can replace more expensive methods of fabrication or manufacture . . . can lead to reduced weight, less machining time . . . fewer assembly operations . . . *greater sales appeal for your product.* AA-166

NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY
Cleveland 6, Ohio

The Nation's largest independent producer of malleable and pearlitic malleable

jobs that these oldsters can do? Why can't the various industries band together and establish a workshop where these oldsters train the new workers—something of an apprentice school? The older men have the knowledge, and if it is not passed on it dies with them. Skilled workers are always in demand, and it seems to me that the company and the community could work together to utilize these retirement-age people until such time as they themselves seek retirement and such time as they need it. Let the men be useful to the company and the community as long as possible and in a way that will not be hazardous to fellow-employees or to the production of the company.

There is no real solution to this or a great many other problems . . . each company must work out its own destiny and the destinies of its old employees.

Charles D Townsend
West Hartford, Conn

WHY ALL THE FUSS about a man retiring at 65 years of age? If a man hasn't saved up enough money to augment his Social Security check to enable him to live comfortably for the rest of his days, that's his funeral. There's no reason why his employer should carry him along any further.

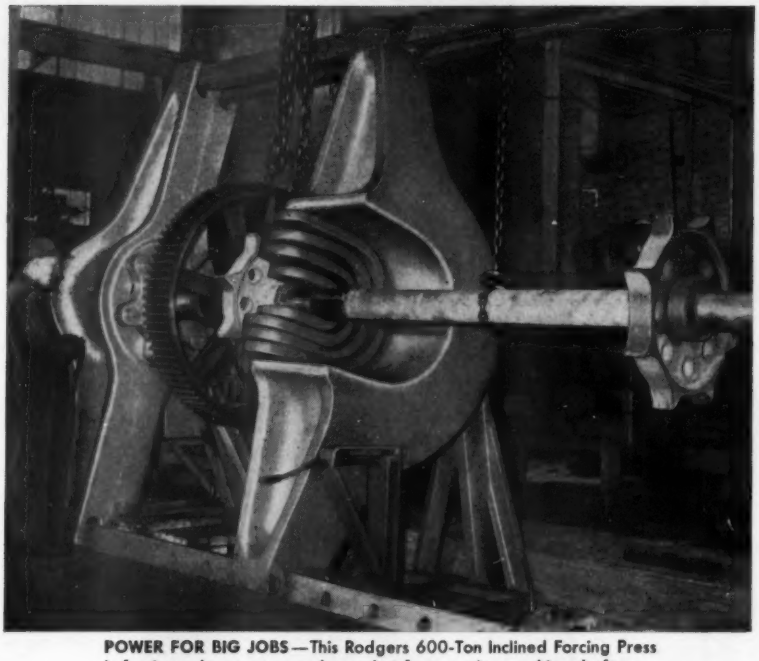
If a man wants to squander his money, as some do, in order to keep up with the Jones's, he has no justification in expecting to be carried on the payroll after he reaches the age of retirement. He should have prepared himself for stepping out of active life so that it would wreak no hardship on him or his family.

There's no sense in letting workers of advanced age make it hard for the younger generation. Oldsters hanging on until they totter creates a scarcity of jobs for the younger element who should be given their chance to make their way in the world. The life expectancy is becoming higher and higher because of the advancement in medicine. If the old fellows would only refrain from getting behind the wheel there is the possibility that they will be filling out application blanks for jobs when they are past 90.

Up to a certain age—not chronological—a man is of some value as a worker, but when he begins to show his true age then, like any piece of machinery, his efforts and accomplishments dwindle to such an extent that he becomes a liability instead of an asset.

I can see no reason why a man should confine himself to definite

A MOUNTAIN of POWER



POWER FOR BIG JOBS—This Rodgers 600-Ton Inclined Forcing Press is forcing a large gear and sprocket from a mine machine shaft.

—or a touch of pressure

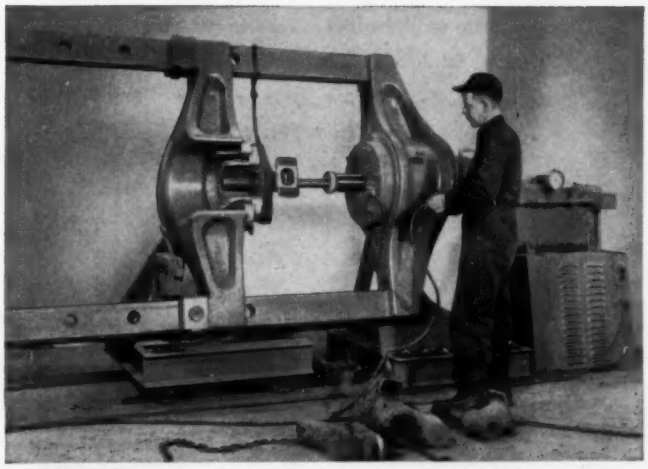
The heavy machines and equipment used in the great iron mining industry present a variety of problems when repair or maintenance is necessary. For this work the accurately controlled action of Rodgers Hydraulic Forcing Presses is a real time and work saver.

A Rodgers Forcing Press puts a mountain of power at your fingertips to force wheels, sprockets or gears from their shafts and for straightening, assembling, swedging or upsetting jobs. Operators also use the versatility, speed, power and positive control of a Rodgers Forcing Press to efficiently perform small pressing and forcing jobs with just a touch of pressure—tasks once done only on vertical shop presses!

you get both with RODGERS FORCING PRESSES

Rodgers vertical, horizontal and inclined forcing presses offer capacities from 100 to 600 tons . . . up to 9 feet between tension bars . . . up to 16 feet between ram and abutment . . . single or double acting cylinders with 13 or 26-inch ram travel (72-inch travel available) . . . electrically powered hydraulic pumps with selective, positive pressure adjustment and remote control . . . removable press cylinders that can be used in special jacking or pulling jobs . . . and many more features that assure you of dependable, long life operation—all fully described in this Rodgers Catalog Number 315A.

Write for it today!

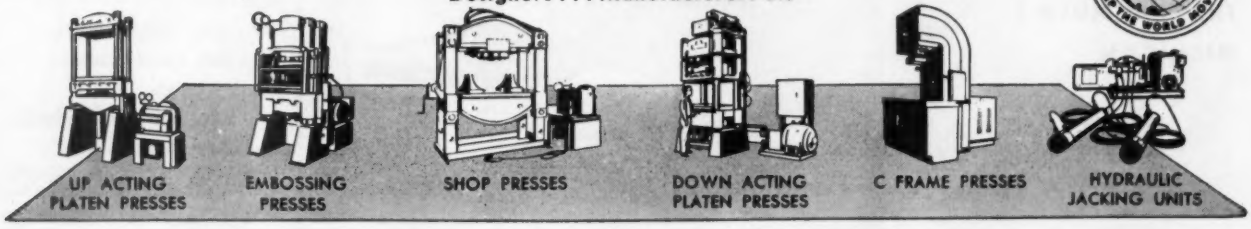


LIGHT TOUCH FOR SMALL JOBS—This Rodgers 300-Ton Inclined Forcing Press is used on small as well as large equipment repairs. Here, a pin is being pressed out of a tractor idler support bracket.

Rodgers Hydraulic Inc. 7407 Walker Street, Minneapolis 16, Minn.

HYDRAULICS Rodgers KEEP THE WORLD MOVING

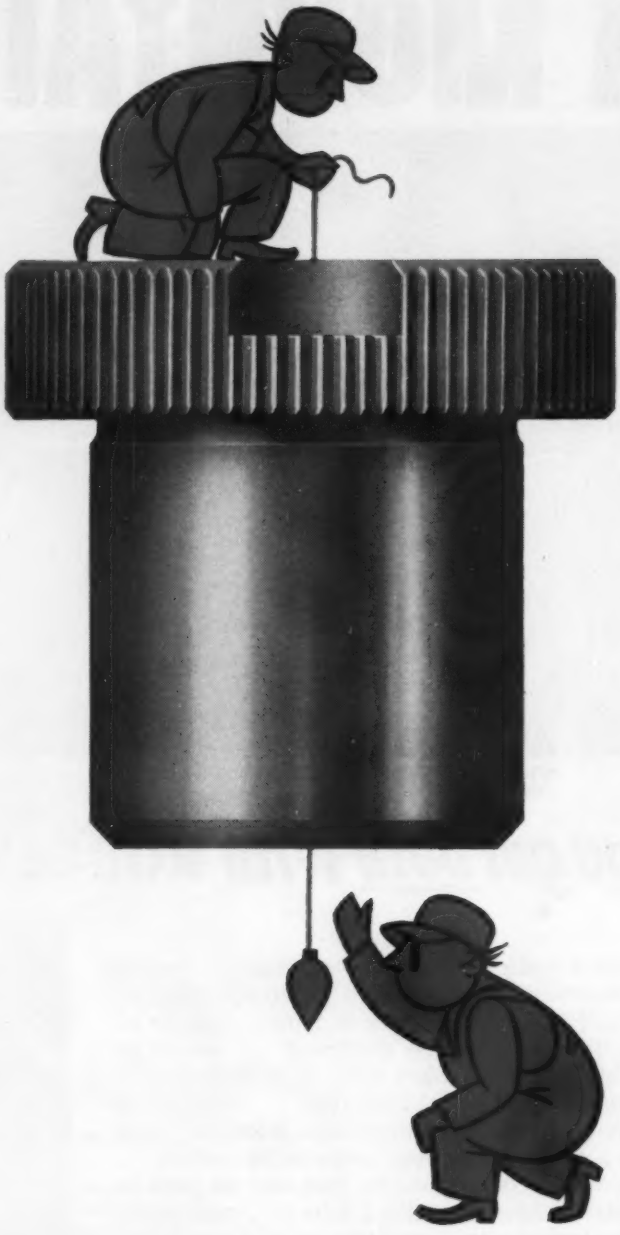
Designers . . . Manufacturers of:



FOR PERFECT ALIGNMENT...

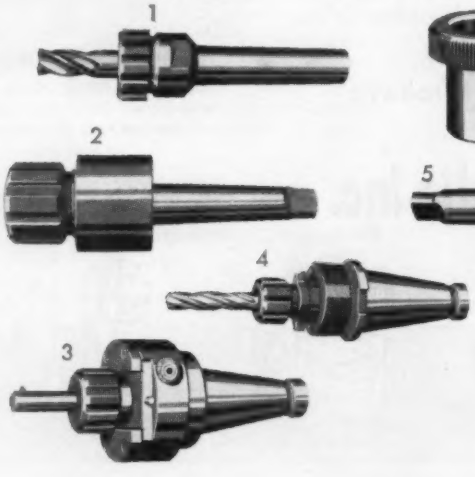
UNIVERSAL
DRILL BUSHINGS

Universal Drill Bushings help increase efficiency and simplify jig drilling operations by insuring perfect alignment of drills. Blended radius on the top inside diameter guides the drill into place and helps prevent tool hang-up and breakage. Superhoned bores keep tool wear to a minimum, especially in close tolerance work. 100% concentricity and hardness tests insure accuracy and uniform high quality. Knurled heads provide a quick, sure grip. Made in a complete range of standard sizes and lengths. Orders for special dimensions will receive prompt attention. For complete information, write to the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N.J.; 5035 Sixth Ave., Kenosha, Wis.—or our home office.



178

UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 1
MICHIGAN



1 STANDARD COLLET CHUCK
2 FLOATING COLLET CHUCK
3 BORING CHUCK
4 "KWIK-SWITCH" TOOL HOLDER
5 MIKRO-LOK BORING BAR
6 STANDARD DRILL BUSHING
7 UNIVERSAL INDEX PLUNGER

hours of work after he reaches the "tired" age of 65. He should be so fixed that he gets up in the morning just when he damn well pleases and putters around with just what he likes to do. He should be in such a position that he doesn't have to take orders from anyone but his wife and, if he has used good judgment in training her, they won't be much. Let him tack a picture of a curling chip up on the wall of his den so that he can look at it if he should by any chance get homesick for those fascinating industrial situations.

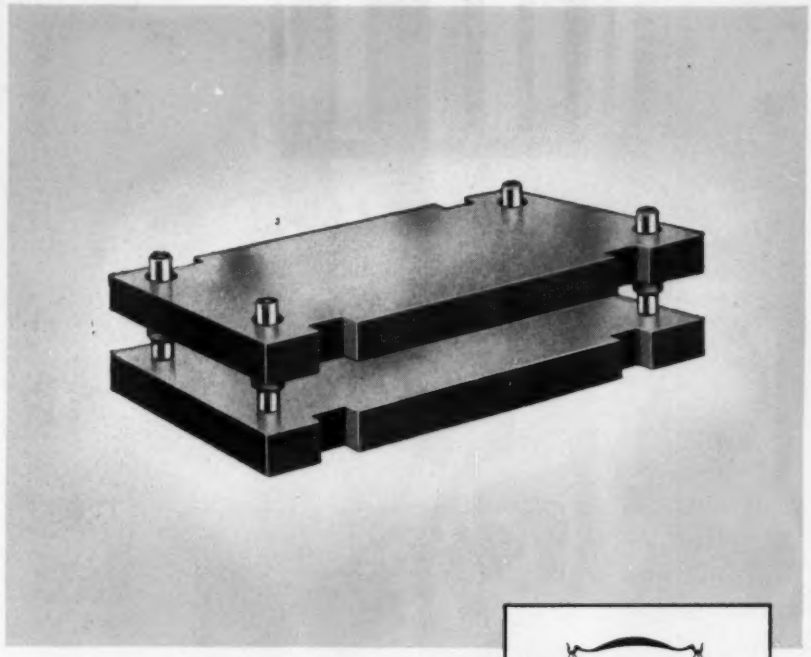
To sum it all up, let him pack up his tools and get the hell out of the shop to make room for the oncoming generation. If he hasn't already done so, let him take up the game of golf, or try his hand at fishing, but whatever you do, you old metal-working has-been, stay out of the disintegrating rocking chair or sure as hell we'll be hearing the hammering together of a six-foot container lined with delicate silk. Pull yourself together, old fellow, and raise hell with your freedom and the first thing you know the kids will be celebrating your 100th birthday and you can smile with appreciation and the anticipation of going on for another 25.

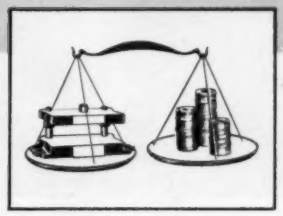
Harrison Mitchell
Topeka, Kan

I BELIEVE THAT A POLICY requiring involuntary retirement at any fixed age to be unfair, unjust, and antiquated. I believe it adversely affects the morale of the employees, deteriorates the position a company holds in the community, and lastly, impairs the efficiency of a company's operations.

It is evident, even to the most biased observers, that all people of

"Hogan, on your application where you claimed you were a steady worker . . . you should have written, 'Motionless'!"





FASTER DELIVERY
on Both
SPECIAL and STOCK
DIE SETS

Now . . . you can get into production faster with a Detroit special or standard die set. *First,* because of our greatly expanded facilities, we are now making delivery in less time. For instance, a standard die set will be shipped within 24 hours; specials in remarkably short time. *Second,* because every *full-value* Detroit die set is built up to our high standard and not down to a price and is factory-tested to specifications. Such precision gives you faster mounting without the delay and cost of reworking the set in your shop. Why not talk things over with our nearby representative? Write today.

"full value"

means that in a special or standard Detroit die set you get what you pay for . . . the exact, specified thickness of both die holder and punch holder, true parallelism of surfaces, precision fit of pins and bushings — all assured by precision manufacture, factory assembly and factory inspection.

•

PRECISION-BUILT ACCESSORIES

In stock for immediate delivery is an extensive range of die-makers' accessories, including the new self-oiling guide pin bushings.

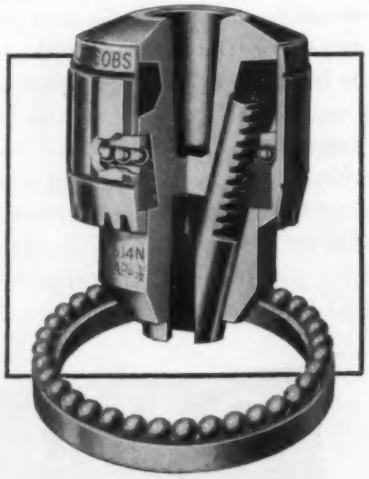
Detroit
DIE SET
CORPORATION

2895 W. GRAND BOULEVARD • DETROIT 2, MICHIGAN
Offices in Principal Industrial Centers

For a **Real Grip** *on things*

Try the Jacobs Ball Bearing Super Chuck. It's a heavy duty chuck for heavy duty drilling . . . a bear for grip and 100% more powerful than comparable plain bearing chucks.

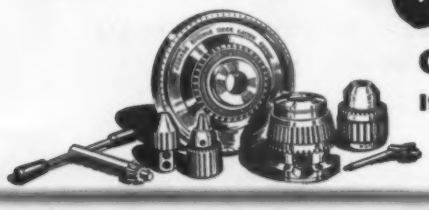
Here's why. The ball thrust bearing rolls away friction between sleeve and nut. Steel jaws close smoothly with tremendous power. The Jacobs Ball Bearing Super Chuck grips harder, and more accurately than any other drill chuck made.



The Super Chuck and the complete line of Jacobs Chucks are stocked and sold by industrial distributors everywhere. See yours, or write Jacobs Mfg. Co., 1603 Jacobs Road, West Hartford 10, Conn. Ask for Catalog 100.

JACOBS AND YOUR LOCAL DISTRIBUTOR
are ready to deliver the chucks you need and the service you deserve.
first in chucks . . . first in service

Jacobs
CHUCKS
If it's a Jacobs it holds



age 65 are neither decrepit nor senile. One might even go further and state that some men and women at age 65 are still better than some of our younger employees will ever be or ever have been regardless of age (omitting, of course, any of the points which might interest Dr Kinsey). Never have I seen any data which correlates one's physiological and mental age with one's chronological age with even a reasonable degree of accuracy. I was amazed, and still am, that a modern, intelligent, progressive company would base its retirement policies on a factor as relatively meaningless as age.

The factors of mental ability, alertness, powers of concentration, flexibility, ingenuity, and creativeness, as related to some work are undoubtedly much more difficult to measure than age, but also have infinitely more effect on a person's ability to perform a specific job. The physical qualities of strength, endurance, coordination, and energy are also more difficult to evaluate than age, but how much more meaning they have in looking at a person's ability to perform a given task. There are known ways of evaluating all such qualities. The latter physical qualities can be measured quite accurately and can be related to a given task quite readily. The mental characteristics admittedly cannot be precisely evaluated, but both standards and methods do exist which will give approximate results.

I will readily grant that it would cost money and take time to evaluate the older personnel in this way, and that it would be more difficult. But since when has modern industry ever shrunk from difficult undertakings? Certainly the scientific basis for this type of testing cannot be disputed. Why then are progressive companies quick to grasp at the easy way, the witch-doctor method, the blindfold test? I'm afraid that farmers are smarter than they are. When a horse can no longer earn his feed, he is destroyed; when the egg production of a chicken falls below a minimum, it is disposed of. Age has absolutely no bearing. Can't enlightened companies apply known tests and make known measurements to determine the approximate output and capabilities of its employees? If a man is no longer capable of performing his assigned duties, let him be retired whether his age be 50 or 90. The free world would have been quite different had Winston Churchill been retired at age 65.

What I suggest would be to form a board to periodically test all employees from age 60 on until their

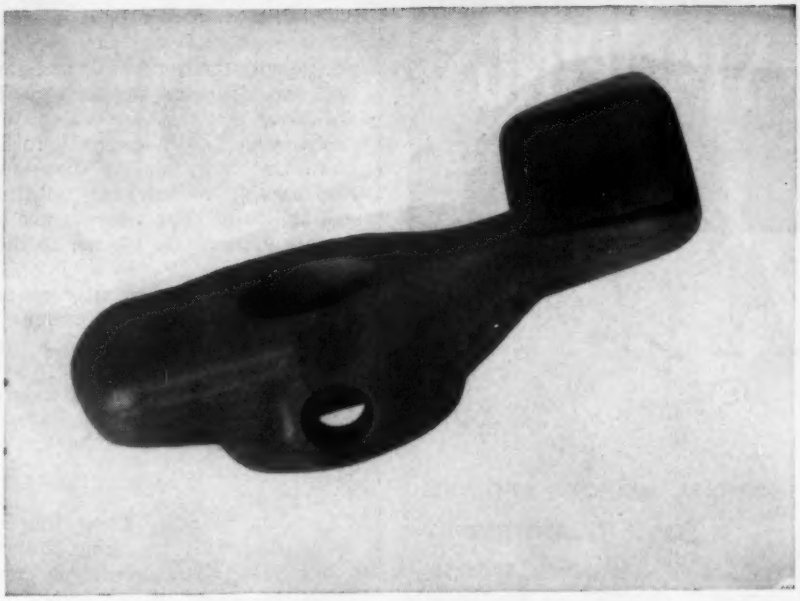
retirement, either voluntary or involuntary. Such a board would be composed of medical men capable of administering and evaluating mental and physical tests. They would be furnished the job description that the man is performing and its mental and physical requirements. They would also be furnished an analysis of the man's abilities by his next two immediate supervisors. The action of the board would be final with appeal action to the president or board of directors as the only alternate permissible.

I am employed by an organization having a fixed age retirement policy. Approximately two years ago I lost the services of a man who had been partially responsible for some of the design work and much of the machining work on components of one of the world's finest observatories. He operated his own business, manufacturing optical instruments of extreme precision during the last war. After retiring for a short period, he came to this organization and was largely responsible for revitalizing our experimental shops. I envied him his youthful outlook and physical energy and I still do.

Within the next two years I will lose through involuntary retirement our most valued gage and experimental inspector. He is a graduate engineer who has now returned to the field of his first love; fine instruments and precise measurements. He has the steadiest, most skilled and adept hands I have ever seen. He is mentally active, alert, and progressive and is in excellent physical condition. The loss of these men has and will weigh heavily on this organization.

Industry needs the services of

"There's so many of the employed loafing, it's hard to tell how much unemployment there is."



How Flame-Plating gives Aluminum the **WEAR-RESISTANCE** of Tungsten Carbide

The manufacturer of this aluminum forging had his cake and ate it, too. By Flame-Plating the wearing surface of this part with tungsten carbide, an unusual combination of lightweight, low inertia, and high resistance to wear was developed. Before Flame-Plating this forging wore out after about 300 hours of operation. After the thin coating of tungsten carbide was applied the wear life of this part easily exceeded the required 1000 hour mark. Another wear problem solved by Flame-Plating.

Flame-Plating is a new LINDE process for applying a coating of tungsten carbide to the wear surfaces of parts and many tools made of most common metals. For the full story on how you can beat wear problems with Flame-Plating, read the new "Flame-Plating" booklet.

CLIP COUPON TODAY FOR YOUR FREE COPY

LINDE AIR PRODUCTS COMPANY, Room 308 E
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

Please send me your free booklet on Flame-Plating, Form 8065

Name.....Position.....

Firm.....

Address.....

City.....State.....

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

STAMPINGS

PILOT RUNS

SPECIAL METHODS PRODUCE SMALL QUANTITIES AT MINIMUM COST.

When you need just a few pieces — when you're still in the experimental stage—then an economical, cooperative source of parts is important.

Our **Machine-Cut Method** avoids custom die costs completely by use of special machinery which skillfully fashions pilot quantities.

Careful calculation determines the point at which labor costs warrant our **Short Run Method,** which uses simple contour dies and special purpose presses.

Best of all, when you get into large quantities on the experimental part, our STAMPINGS DIVISION is still your most economical producer, using our **Production Method.** Thus all three methods are at your disposal. And impartial choice of method *saves money* for you!

STAMPINGS DIVISION

LAMINATED SHIM COMPANY, INC.

3103 Union Street, Glenbrook, Conn.

people like these. Perhaps it is possible to go out and hire younger people with the same skills and abilities, but demands for such people are heavy and they are scarce. Why exchange a known quantity for an unknown? Why should these men stop serving industry so faithfully and skillfully? The answers are not readily apparent to me nor to these people.

I sincerely and urgently request that the policies on retirement be re-examined and modified to be more in keeping with today's moral, spiritual, and intellectual standards.

R E Moulton (age 39)
Huntington Park, Calif

THE KING IS DEAD! Long live the King! Generally speaking, the 65-year-old industrial employee is expendable as far as his productive usefulness is concerned. We have not the slightest doubt, however, that he is an abler, a more conscientious, a better all-around man than many of the workers he leaves behind. From my actual experience employees retiring at 65 are the cream of the crop. We sure miss them around our shop.

As the oldtimers leave we wish them luck, success, and a long, useful life. The free enterprise system, labor unions, management, and investors owe a great debt to them. Their sweat and labor, their ideas and inventions, have contributed much to our industrial economy. Often their work has gone unheralded and unsung. Younger and more clever men have plucked the fruit from the vines which they have planted.

Some veteran workers are eager to retire. Others are loathe to leave the scene of their triumph over so many problems. It can be heartbreaking to realize that you no longer belong to a group of pleasant working companions, that you are no longer a part of an organization which embraces the friends of a lifetime, that your interests are no longer those of men with whom you have spent so many enjoyable hours.

Yet, retirement at age 65 is a good thing. It is something for which we must all prepare, and help others prepare. It is an evolutionary development of the industrial revolution. And a good one at that.

When the industrial revolution began under the mercantile system children were taken from their homes to labor in dungeon-like mills. From such has evolved free enterprise and its philosophy of decentralization. The current idea is to accord increased recognition to the individual, to better appreciate his problems, and his ability to contribute. Children of industrial employees, once worked into an early grave, now have the opportunity to be worthy of their creation in the image and likeness of their Maker.

Early economists believed that the wealth of a nation consisted in its ability to produce as much as possible while consuming as little as possible. Thus it was once patriotic to pay workers as little as possible, allowing them to just barely exist and to live long enough to procreate recruits for the local salt mines. Excess goods were sold abroad to secure a favorable balance of trade.

In those days it was consumers, not producers, that were expendable. Industrial workers never lived to retire. In fact the wealth and might of more than one great nation was built upon their graves.

Roughly speaking, man should spend his first 20 years getting the necessary education and training to make this a better world for his having lived in it; the next 40 as a provider of goods or services. The final years should be spent in doing what he wants to do.

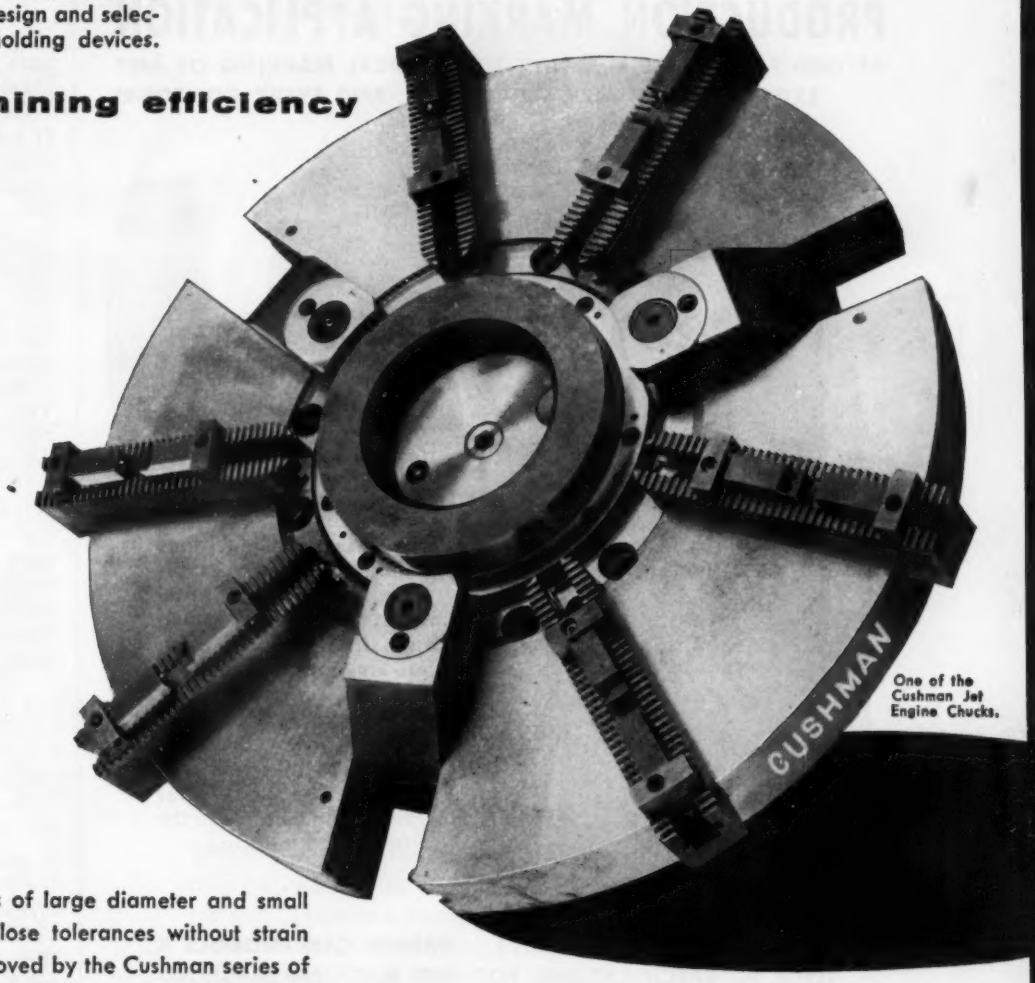
One never has enough time to read

"Bandock is noted for his impossible cuts."

CUSHMAN chucks give Chuck-ability

CHUCK-ABILITY — The ability to SPEED your work . . . ELIMINATE fatigue . . . IMPROVE your products . . . and REDUCE your costs . . . through design and selection of the right work-holding devices.

the key to machining efficiency



One of the Cushman Jet Engine Chucks.

Efficient machining of jet engine parts of large diameter and small cross-section to extremely close tolerances without strain or distortion was materially improved by the Cushman series of special chucks designed and built for this purpose. These chucks completely overcome the inherent difficulties of the operations and permit mass production of these vital component parts. The success of these new chucks is one more proof that Cushman gives **Chuck-ability** as an essential to efficient production.

Manufacturers throughout the country have long recognized and used the Cushman Engineering Department for solutions to chucking problems. We invite you to use this experienced service.

THE CUSHMAN CHUCK COMPANY
Hartford 2, Connecticut
a world standard for precision

CUSHMAN the CHUCKMAN CHUCKS AND ACCESSORIES Exclusively SINCE 1862

SEE YOUR INDUSTRIAL DISTRIBUTOR

manufacturers of:

Air Operated Chucks, Cylinders, and Accessory Equipment . . . The Cushman Power Wrench . . . Cushman Manually Operated Chucks and Face Plate Jaws.

Visit us at Booth No. 652
ASTE Western Industrial Exposition

HYDRAULIC MARKING MACHINES by Parker

UNSURPASSED FOR EVERY PRODUCTION MARKING APPLICATION

AFFORD FASTER, BETTER, MORE ECONOMICAL MARKING OF ANY LEGEND . . . ON ANY MATERIAL . . . AND EVERY CONTOUR!

No. 650 PARKER MARKING MACHINE

Parker Marking Machines are unmatched for versatility—stamp lettering, trademarks, graduations, knurling in limitless varieties on flat, irregular or curved surfaces of different diameters. Each impression is clean and sharp—indelibly stamped to uniform depth—in far less time, to far greater precision than the finest hand marking.

PARKER CAN PRODUCE A TOOL TO SPECIFICATIONS FOR ANY MARKING MACHINE!

Interchangeable type holders . . . roll dies . . . flat dies . . . engraved knurls—whatever your requirements, Parker engineers and craftsmen can produce a marking tool to your specifications to fit any marking machine.

GET COMPLETE INFORMATION:
Send today for literature on the Parker 650 Marking Machine.

THE PARKER STAMP WORKS, INC.
MARKING DIE & MACHINERY DIV.
FRANKLIN AVENUE • HARTFORD, CONNECTICUT
by Parker

all that is worthwhile, to write what he thinks, to enjoy the company of his children and grandchildren, to hunt, to fish, to care for his flowers and shrubs and trees, to see how the rest of the world lives, to help out the various fraternal and charitable organizations to which he is partial, to take a more active part in church activities.

Pension funds, social security benefits, and savings plans will enable the industrial worker to do these things.

Get all the education you can. If you can't get education, get technical or mechanical training. Work steadily. Keep healthy. Don't lose your sense of humor. Save a little of your money regularly. Thrift is the greatest of industrial virtues, but not one to be carried to extremes. When you reach 60 or 65 go out the back door and give some one else a chance.

When you do go out, keep active. You are not washed up when you retire from your steady job. You are on the threshold of a new life. It is time to relax by doing what you have always been trying to find the time to do. Don't forget to come back and pay us a visit once in a while. Come back and see the mess we've made of things. Come back through the front door. You'll be King for a day.

Peter A Seward
Swampscott, Mass

•

MUFF 'N STUFF

Is it better to attempt to track down the operator responsible for a piece of spoiled work, or should a reasonable amount of scrap be overlooked? Will the worker profit by an individual lecture?

AL IS TACKLING a very important and a very difficult job. It is one which has puzzled many foremen and managers since we started machine shop work. This was one of the headaches that piecework was intended to relieve. Men were only paid for work which passed inspection. But on small work it is not always easy to keep an accurate account of the rough parts supplied to the workman. On small parts the count was often made by weight and a few spoiled parts from a lot of a thousand was to be expected.

In fact, as Ed says, it is next to impossible to entirely eliminate spoiled work. The head of a large plant once remarked to me, at the time when men were discussing the

Air Operated Chucks, Cylinders, and Accessory Equipment . . . The Cushman Power Wrench . . . Cushman Manually Operated Chucks and Face Plate Jaws.

40-hour week, "If we could eliminate spoiled work we could easily afford the five day week they ask." Even with the best machine equipment and a good crew of operators we will have some spoiled work as long as tools wear and break, and machine parts get out of adjustment, even if men never made a mistake. And we all do.

One shop tried years ago to reduce this by exhibiting important pieces of spoiled work for all to see. The exhibit was near the entrance where all could see it. Each piece was labeled with the cost of the work spoiled and the loss incurred because of the spoilage. Such losses were often due to delay as well as to the value of work itself. Few shops ever gave the name of the spoiler. But this was not necessary; the men knew automatically who had worked on the spoiled part.

All of us have made mistakes and will probably continue to do so. The old saying that "the man who never makes a mistake never does anything" is still true. Nor have plans for directly penalizing the man who spoils a piece of work once in a while often worked out satisfactorily.

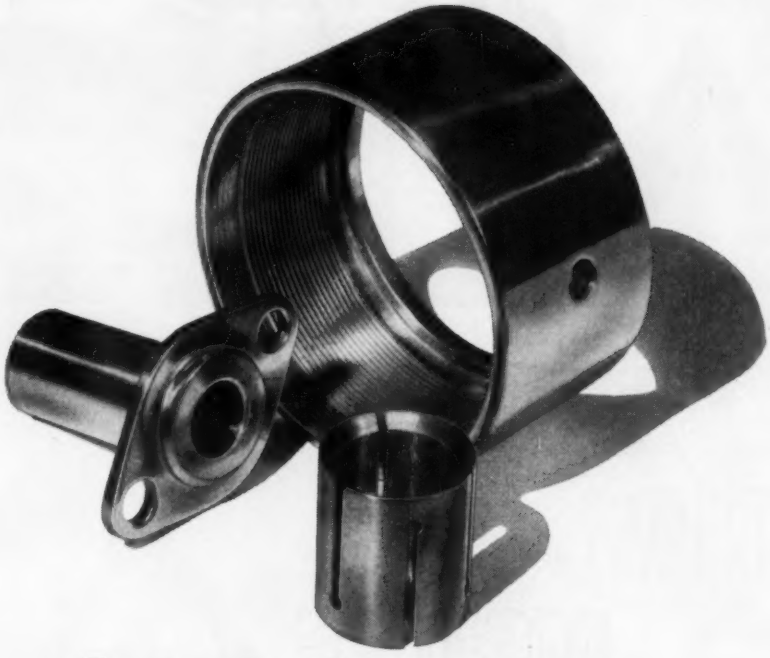
I recall one railroad superintendent who told me an interesting story in this connection. One of his machinists on a night shift went to sleep and caused heavy damage to an old boring mill that the super had hoped would be smashed so he could get a new one. The man left in a hurry without stopping to collect back pay. The super said "I wouldn't have fired him. I'd have given him a raise instead."

It seems a better and more positive method to reward those who make mistakes less often than the average. Men who make few mistakes naturally get the best jobs. And it might be a good idea to reward those who make the fewest errors either by a

"You were expecting maybe Marilyn Monroe?"

THE LOW COST BEARING THAT...

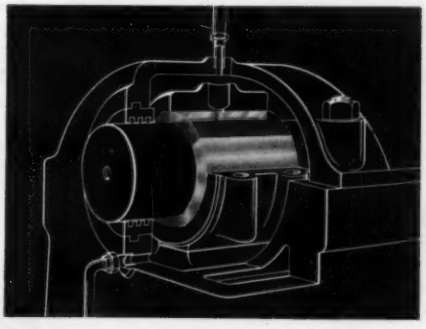
meets many needs



Cast Bronze Bunting Bearings can be supplied in many forms from the simplest to the most intricate. They offer many ways to cut the cost of both design and production without any sacrifice of performance or durability.

It may save you much expense and trouble to find out what Bunting Bronze Bearings can do for you. There is a Bunting engineer near you for consultation. Or write our Product Engineering Department at Toledo.

The Bunting Bearing offers ways to reduce the cost of a design and to employ designs that provide more economical production as well as lower initial cost.

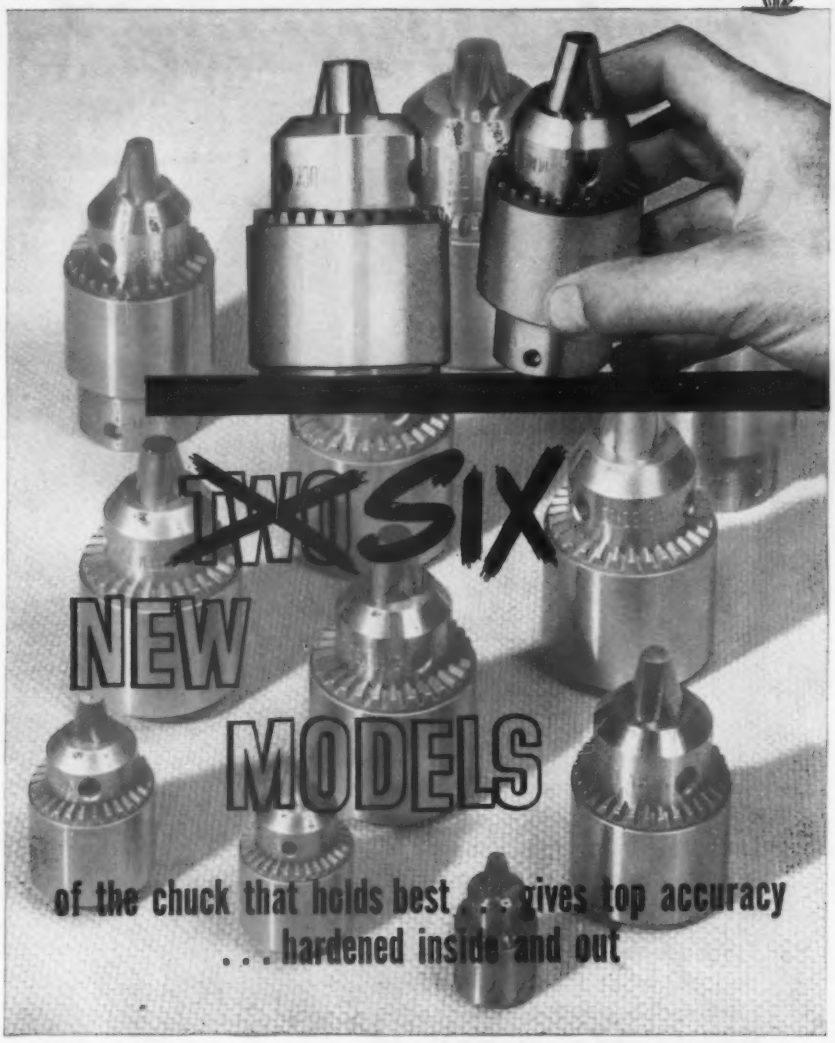


Bunting®

BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

THE BUNTING BRASS & BRONZE COMPANY, TOLEDO 1, OHIO
BRANCHES IN PRINCIPAL CITIES • DISTRIBUTORS EVERYWHERE

SUPREME is on the grow!



During the past three months, Supreme Products have introduced six new models of Supreme Chucks. Why? Because America's tool makers and tool users demanded them. These expert buyers have discovered that from Supreme Chucks, they get a quality of performance not otherwise available to them.

One great new Supreme Model is the 1.5T33. This is the only chuck made with a full capacity range of from 0" to ½" and with such a small lightweight body. Easy operation, light but sturdy construction, low price, compactness, are features of this new drill press chuck.

Other new Supreme Chucks are:
15T 33-C—Cap. 0"—½" (ball bearing lock collar)
9T3—Cap. 3/16"—¾"; **9F**—Cap. 3/16"—¾"
8T3—Cap. 1/8"—3/8". **8F**—Cap. 1/8"—5/8"

Each of these fills a special need on new equipment and for replacement use.

18 OUT OF 21 LEADING POWER TOOL MAKERS are now equipping all or a part of their output with Supreme. Ask your distributor to demonstrate them on your own machines. Fully interchangeable with other makes.

Order from Your Distributor

Supreme
PRODUCTS, INC.
2222 So. Calumet Avenue
Chicago 16, Illinois

cash bonus, or by an extra vacation with expenses paid.

No good foreman can laugh off or forget mistakes, especially when they are expensive and delay the work. But he gains little by nagging or sarcastic remarks. This is in fact apt to cause further mistakes. Then, too, we must remember that sometimes mistakes are the fault of the drawings or even of the foreman himself in not making his instructions clear, especially to a new man who is not used to either the work or the foreman. In no case is it wise to use Sherlock Holmes' tactics, nor should they be necessary.

Fred H Colvin
Point Pleasant, NJ

THE QUESTION of whether we should actively hunt for someone to hang spoiled work on is really a problem. Certainly this would be quite a world in which to work if every error was made into a mountain and one had to account for every mistake made each day. We might remind Al that "what is sauce for the goose is sauce for the gander." Would he want his boss snooping around to pin that error in production delivery or the failure to meet the estimated cost on him? No, certainly not. Al would remark, "Well, that's different. Those were only guesses and after all, no work was spoiled." Here is where we must part company, for to make an estimate that is wrong, or to completely miss on a production schedule through mis-management is as serious an error as spoiling a piece of work in the shop. The company depends upon such information to make its profit. Its whole life is wrapped up in the ability to properly price and deliver its product. Al is responsible for much of this. Is he doing the job? Is he above reproach?

So when we turn to spoiled work

Tool Steel Topics

BETHLEHEM STEEL

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributors: Bethlehem Steel Export Corporation

Maker of Tableware Likes Economy of Striking Die of Bearcat

A maker of stainless steel tableware had been using striking dies which produced average runs of 19,000 pieces. Good, they thought, but perhaps by experimenting they could find something better. So they decided to switch to Bethlehem Bearcat Tool Steel, then watch their production figures. The number of pieces per die doubled, right from the start.

The Bearcat dies, used in working grade-rolled stainless blanks of varying thickness, are hardened to Rockwell C 56-58. As no redressing is possible, they are run until failure occurs. The shop superintendent says: "Bearcat is doing a phenomenal job. We particularly like its resistance to shock."

Besides shock-resistance, Bearcat is well suited for any application where good machining is essential. It is deep-hardening in air, and offers low distortion in heat-treatment. For some applications, it can be carburized easily for long wear.

TYPICAL ANALYSIS

C	Mn	Si	Cr	Mo
0.50	0.70	0.25	3.25	1.40

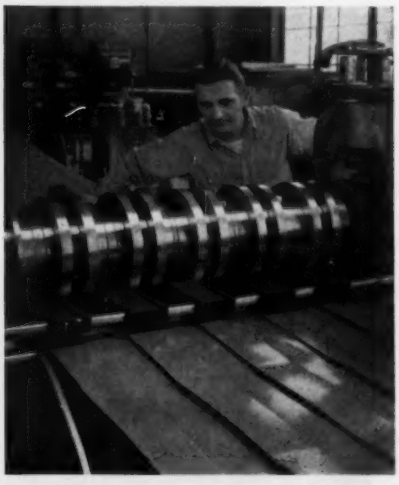
In addition to its use for striking dies, Bearcat is also ideal for master hobs and engraving dies, used in related industries. You're sure to like Bearcat, no matter where you try it. Why not order a supply today from your local tool steel distributor, or from our well-stocked mill depot.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

You Can Reduce Warpage by Supporting Tools During Heat-Treatment

Warpage of tools in heat-treatment is usually associated with the geometrical shape of the tools, or the manner in which they are supported during heating for the quench. When steels are heated in the critical range, just prior to quenching, they are weak, and if not supported properly, will sag or flow plastically.

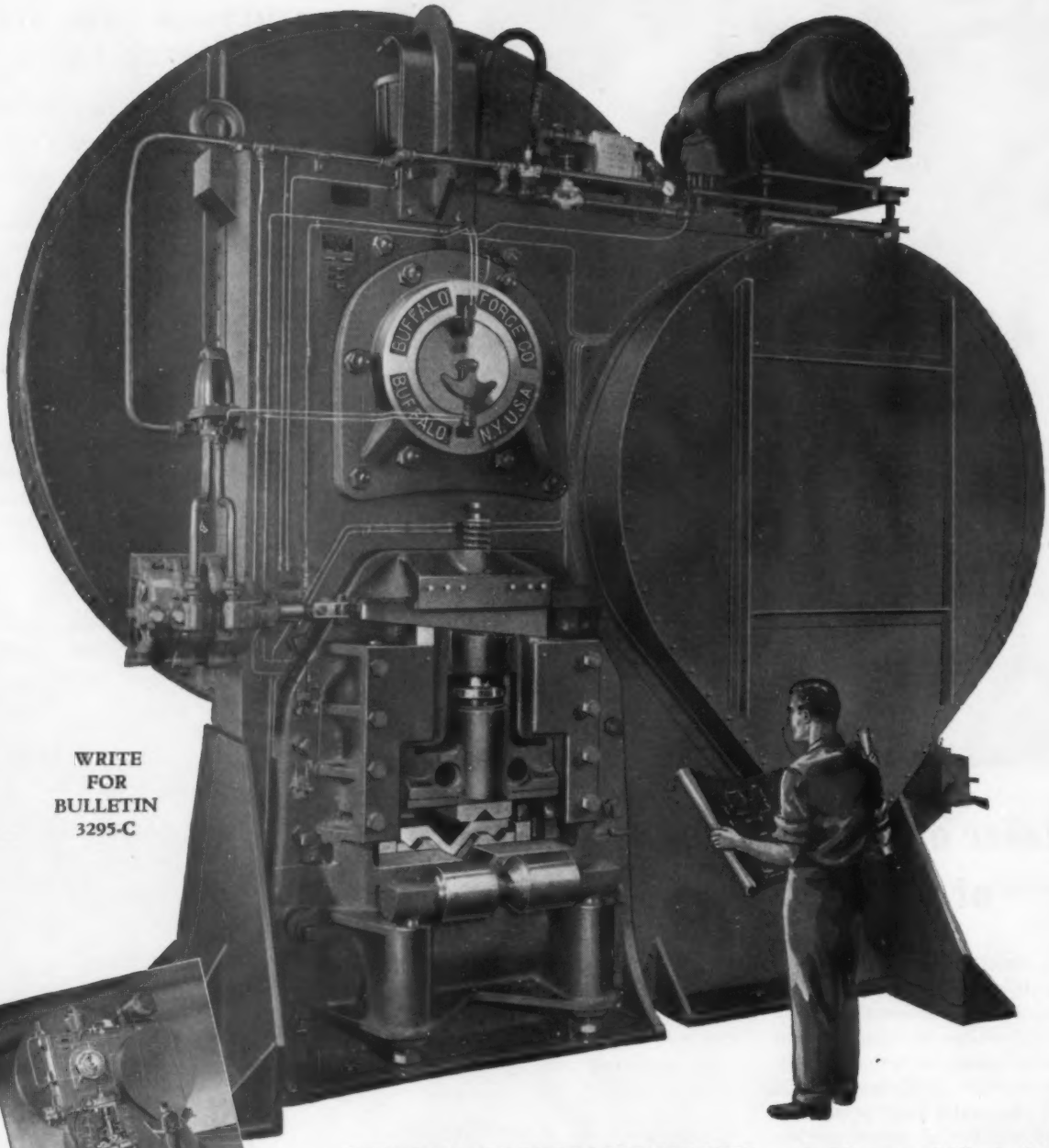
Long tools should be supported at frequent intervals along their length. If section changes are present for appreciable lengths, the tools should be supported at each section. However, the span between supports should not exceed three times the tool diameter.



LEHIGH S SLITTER KNIVES MAKE SHORT WORK OF STRIP STEEL

These knives, made of Bethlehem Lehigh S tool steel, are slitting cold-rolled strip steel to proper width, preparing it for a punch-press operation making sheet-metal parts. Lehigh S is our oil-hardening type of high-carbon, high-chromium tool steel. Its high hardness and maximum resistance to abrasion make it a steel with the ultimate in wear resistance.

IF YOU'RE LOOKING FOR COSTS —



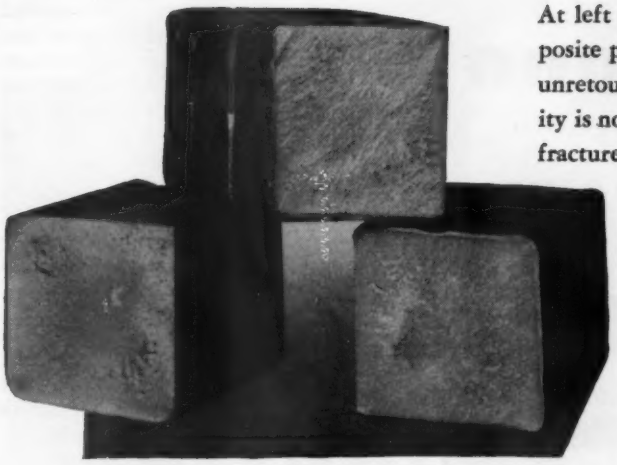
WRITE FOR BULLETIN 3295-C

CUTS SIX 10″ ROUNDS PER MINUTE, or six 9″ squares! That's the kind of speed the "Buffalo" No. 17 Billet Shear can put into your preparation of forging stock! The largest of 11 sizes, to meet a wide variety of requirements.

In all "Buffalo" products is the Q Factor—the built in Quality which provides trouble-free satisfaction and long life.

LOWER METALWORKING

LOOK INTO "*Buffalo*" BILLET SHEARS



At left are 9" squares cut by a No. 17 Billet Shear (see opposite page). Note how clean and square the cuts are in this unretouched photo. Note the absence of "smearing"—porosity is not concealed to give you troubles later on. This shear-fracture method is your fastest and most accurate way of dividing billets for forging. High-production speeds range up to 30 strokes per minute on our smallest shear, which handles 2¼" rounds. Rigid, arc-welded steel plate frames, power feed lubrication, overall excellence of engineering make these machines equal to the toughest production runs. Check into these and "Buffalo" Bar Cutters by writing today for *Bulletin 3295-C.*

LOOK INTO "*Buffalo*" UNIVERSAL IRON WORKERS

Want a machine that will do *all these* jobs *without changing tools?*

1. Punch-slit-miter-shear flat bars
2. Cut-notch-cope-punch angles, tees, channels, I-beams and plates
3. Punch web and flange of channels and I-beams
4. Miter at 15°, 30°, 45°, (the only machine with instant miter settings)
5. Trim legs of angles
6. Cope angle legs (the only machine with independent notcher and coper)
7. Cut rounds, squares, reinforcing bars

Hundreds of these compact, powerful machines are doing the above operations in metalworking shops. All facts and capacities in Bulletin 360—your copy on request.

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

BUFFALO FORGE COMPANY

509 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

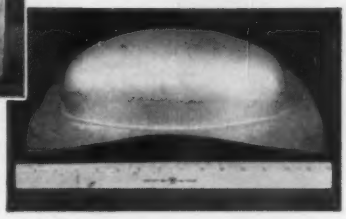
DRILLING • PUNCHING • SHEARING • BENDING

GOODYEAR AIRCRAFT

Slashes TOOLING COSTS by 50 to 75% with HYSOL 6000 Series EPOXIDE RESINS

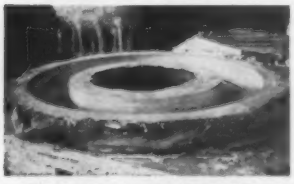
Cast spinning chuck for spinning aluminum.

.051" thick 51S type aluminum being formed on plastic die which was cast.



.051" thick stainless steel part drawn on plastic die.

Cast plastic hand-forming assembly block.



Plaster mold used for casting of plastic.

Tool being cast into plaster mold.

Material and fabrication time are the major considerations in tooling costs. Goodyear saves 50 to 75% with HYSOL 6000 Series tooling plastics! Here's how: . . . Per volume costs are cheaper than metal. Fabrication time and expense are also cut . . . tools are produced faster and with no increase in personnel or capital investment. A plastic die can be cast or laid up directly from master die models without hand barbering or fitting, requiring little skilled labor and no expensive machinery. Time is slashed, and a tool can be completed and in use within a few days. HYSOL produces more tools per dollar than any other method and eliminates large stocks of various sizes of steel and all metal waste.

Plastic tooling may solve your problems. HYSOL plastics are useful in a variety of molding, casting, laminating, and allied applications. Our research, design, and production departments are ready to serve you. Write, wire or phone.

PROGRESSIVE PRODUCTS THRU CHEMICAL RESEARCH
HYSOL
Product of HOUGHTON LABORATORIES, INC.

houghton laboratories, inc.
OLEAN, NEW YORK

in the shop, much of the responsibility for this is governed by the actions of the foreman. Is he on the job? Does he know what is going on before it is too late? Has he inspired his workers to do work or does he, through his own actions, tend to say "anything goes except when I get pushed from the top?"

A good foreman knows who in his shop does good work—he doesn't have to periodically gun for someone to hand the blame to for spoiled work. His reports which give him this information show the workers in a true light. If he can analyze his reports, he has his answers. Action should be taken quickly and effectively on those who continue to run high scrap loss.

Perhaps they are unsuited for the work, or maybe they are just plain sloppy workers. There are both kinds—one you can help, the other it is wise to get rid of. But before you act, know the ground upon which you tread. Don't go off on a tear and be sorry later. Employees cost money to train; it's cheaper to keep them producing economically than it is to keep training them.

Never forget that a good employee who knows the work and the shop is worth three new employees who must learn the art of getting along in the plant.

So we close with this thought for Al. Use the facts at your command. Study your reports and learn who causes you the trouble with scrap. Then act, but don't just "guess." Know what you are doing. Be a good executive.

Charles D Townsend
West Hartford, Conn

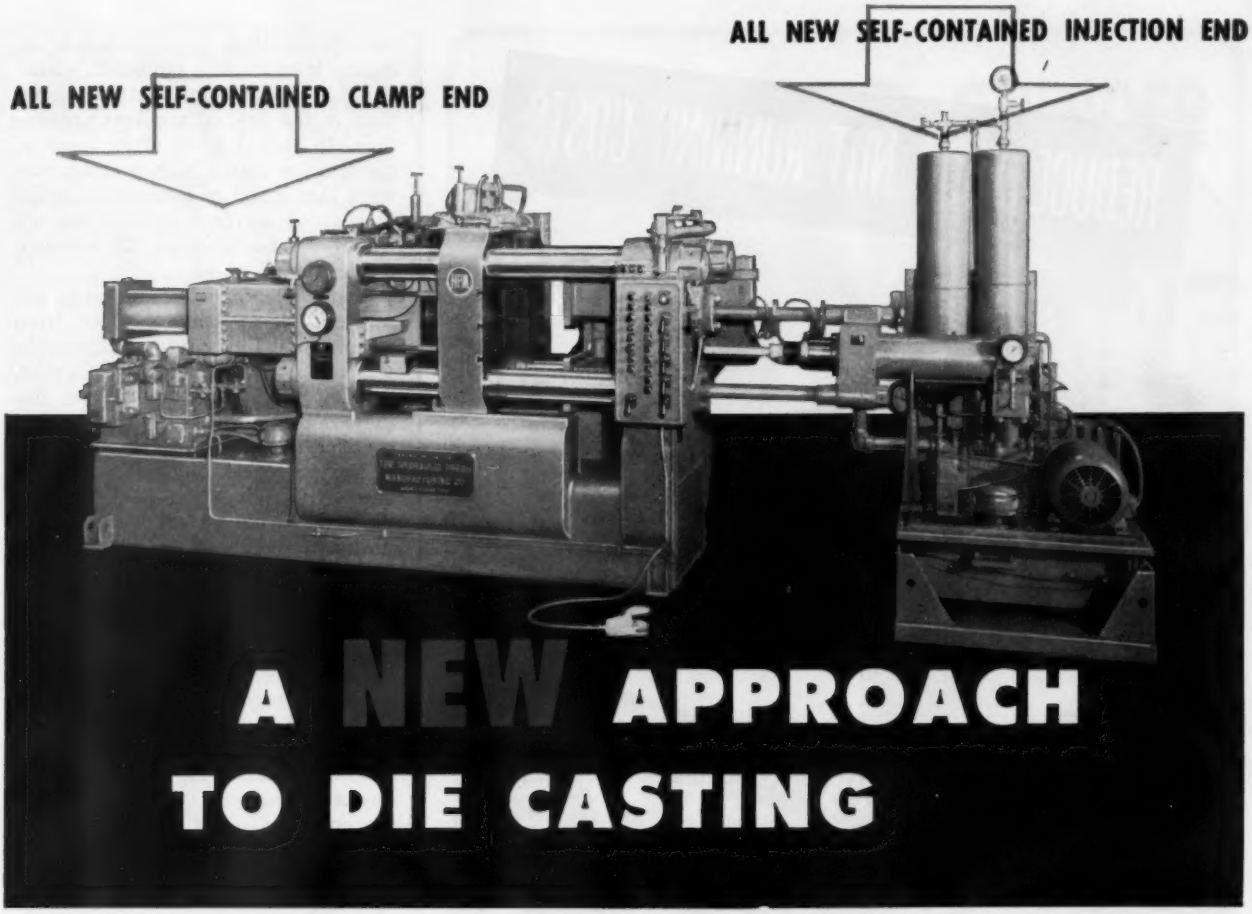
•

ACCIDENT-PROOF, FOOLPROOF

What measures can, or should, be taken to make workers safety-conscious, once proper equipment has been installed in the plant? Is this management's responsibility, or are workers on their own?

THERE IS NO DOUBT that plant safety is a joint responsibility of the shop men and the management, but it is the responsibility of the management to give a lead in safety precautions and try to prevent the shop men from suffering from their own foolishness. After all, if there was no plant, there would not be any dangerous situations created and it, therefore, behooves managements to keep their part of bargain so far as they find it humanly possible.

No one need be ignorant about the causes of industrial accidents and



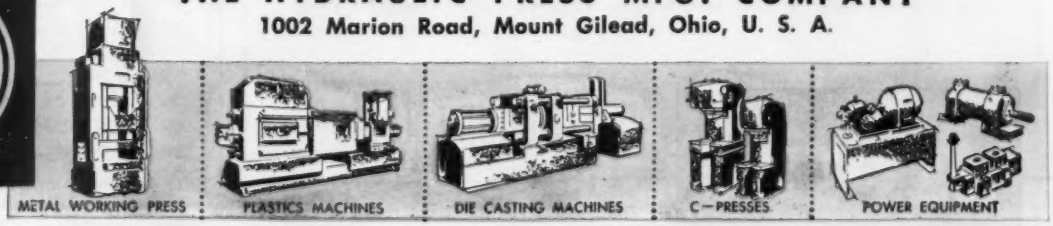
New H-P-M Die Casting Machine offers more than just New Machine Design

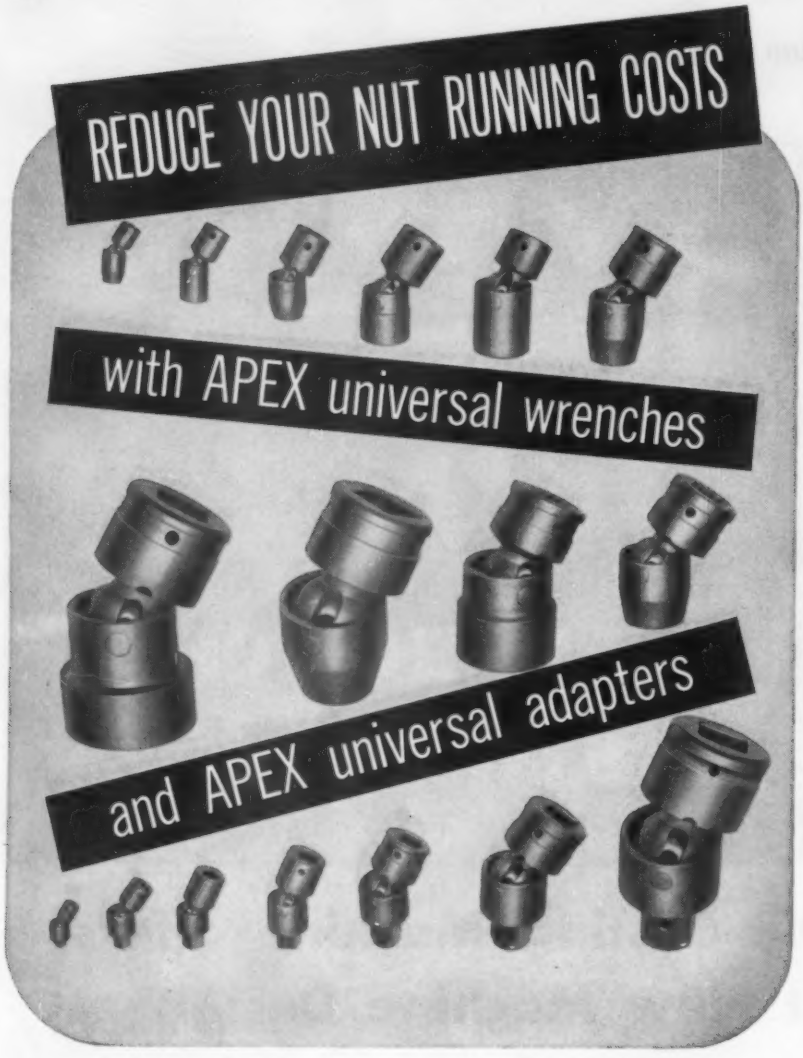
The new H-P-M die casting machines are being hailed as the most important advancement in die casting in fifteen years, and rightly so . . . more than forty new and improved features! These features result in minimum mold flash . . . faster die set-up . . . greater versatility in die usage and casting design... reduced maintenance . . . maximum safety and performance. The new self-contained Link-Wedge mold clamp is the best. There's plenty of "beef" in these new models. They are available in a complete range of sizes... cold chamber or gooseneck types.

Write for Bulletin 5400 which describes these new units in detail.

HPM

THE HYDRAULIC PRESS MFG. COMPANY
1002 Marion Road, Mount Gilead, Ohio, U. S. A.





Nut running is faster and safer with Apex impact quality universal wrenches. Faster—because these tools are designed to provide power closer to the work. Safer—because these tools have non-locking construction to prevent catching or binding, even when operating at extreme angles. Apex male and female adapters are particularly useful on service and maintenance work when used to convert standard sockets into universal sockets. Complete information on all Apex nut running tools will be found in Catalog 29. Write, on your company letterhead please, for your copy.

APEX nut running tools

THE APEX MACHINE AND TOOL COMPANY
1026 So. Patterson Blvd. • Dayton 2, Ohio

their prevention. In no branch of industry is more data collected, statistics issued, and information given than in the field of accident prevention. In fact, I have often been of the opinion that if high productivity were publicized in a manner similar to that of accident prevention, we would all be working 20 hours a week instead of 40.

Managements cannot prevent the careless turret-lathe operator from inserting his finger into an internally screwed hole when it is revolving, thereby tearing off the finger, but they can institute a lot more foolproofing devices than they are doing at the present time. It is a matter on which machine tool designers and the like are never given the opportunity to exercise their ingenuity. In many cases, a safety device increases productivity.

Consider, for example, the demounting of a heavy chuck from a lathe spindle. This was once a very hazardous process and many strained backs, and crushed fingers and toes resulted from it. Simple jib cranes and other mechanical chuck-handling devices have been incorporated into the construction of some European-built lathes and these not only avoid hard work on the part of the lathe operator, but they reduce the time taken to change chucks and other workholders by enabling the man to do it safely, single-handed. There is no waiting for the services of a crane and its attendant. The same idea has been incorporated into some American-built universal milling machines for the handling of heavy dividing heads.

The wearing of goggles for protecting the eyes during tool grinding and similar operations has always been a source of trouble in safety-minded shops. Instead of insisting on the wearing of goggles, which are a confounded inconvenience, it is high time that another method of

"Do you have anything cheaper than this machinist special luncheon? I'm only an engineer."

protecting the users of grinders from flying grit was adopted.

I had the experience of designing means for overcoming the inconvenience of goggles and the result was described in the Practical Ideas section of the American Machinist for November 17, 1949. In essence, the approach to the shielding of the worker's eyes was to fix the shield on the actual machine in the form of a large piece of tough transparent plastic. It was realized that operatives would still grind with the shield moved out of position, so their attempts at self-destruction were thwarted by incorporating a rotary switch into the eye-shield swivel. By this arrangement, the shield had to be lowered to a safe position in order to start the grinding wheel motor.

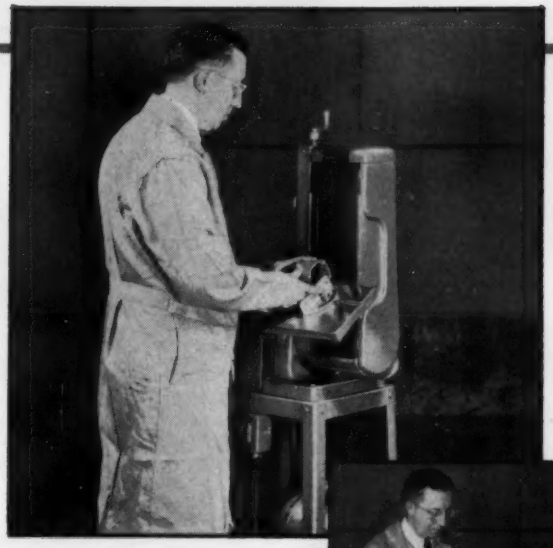
We found that commercially produced transparent grinding wheel shields were far too small to be effective; we therefore made our own from one large rectangle of frameless plastic which stretched right across the front of the shop tool grinder and extended beyond the edges of its two wheels.

Operatives complained that they could not see their toolbits during grinding, with the shield in place. We found that the level of illumination on the grinding rests was far too low for precise work. We found that the illumination could be improved considerably by incorporating tubular electric lamps into the construction of the grinder shield.

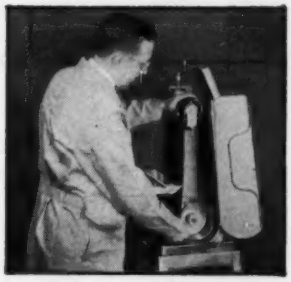
With the advent of tough, modern, transparent plastics and interlocking switches there is no excuse for inefficient guarding of machine tools. Many automatics are now fitted with sliding transparent shields, but it is noteworthy that these have been necessitated, in the first instance, by the need to confine the cutting oil to the machine and prevent it flying over the shop. The fact that the machines are now much safer is merely incidental. The guards could have been instituted in the first instance as safety devices and the saving of cutting oil and the avoidance of messy floors would then have been incidental.

As a designer who has been called upon to improve machine-tool safety in many instances, I recall no example in which operating efficiency has not been improved by provision of the safety device. For example, we wanted to protect the eyes of a girl operating a very tiny precision grinding machine and we installed a screen of clear plastic. Then it was realized that the visibility of the operator would be much improved if

NEW 6" BELT GRINDER only $165.00!



Model 648 Belt Grinder can be changed to horizontal position in just 5 seconds.



Belts easily changed—no need to tilt idler pulley.

THIS LOW-COST Engelberg/ Porter-Cable Abrasive Belt Grinder supplements other machines in your shop to step up production and improve results. Use it as a clean-up machine alongside the miller, shaper, automatics, hacksaw or shear. It will remove burrs, cutter or tool marks with speed and smoothness. Use it for polishing, taking off stock, breaking sharp corners. Use it in the gear-cutting department where it will whisk off a burr in an instant. Use it to touch up tools for the set-up men. Use it in the assembly department for fitting parts. Us it in the tool room for grinding flats, making and repairing jigs, sharpening tools.

Practically every department in your plant will find scores of uses for this latest addition to the Engelberg/Porter-Cable line of Abrasive Belt Grinders. Get complete information—mail coupon today.

THE ENGELBERG HULLER CO., INC.

The ENGELBERG Huller Co., Inc.
183 Seneca St., Syracuse, N. Y.

Send complete information on new Model 648 6" Belt Grinder and name of nearest distributor.

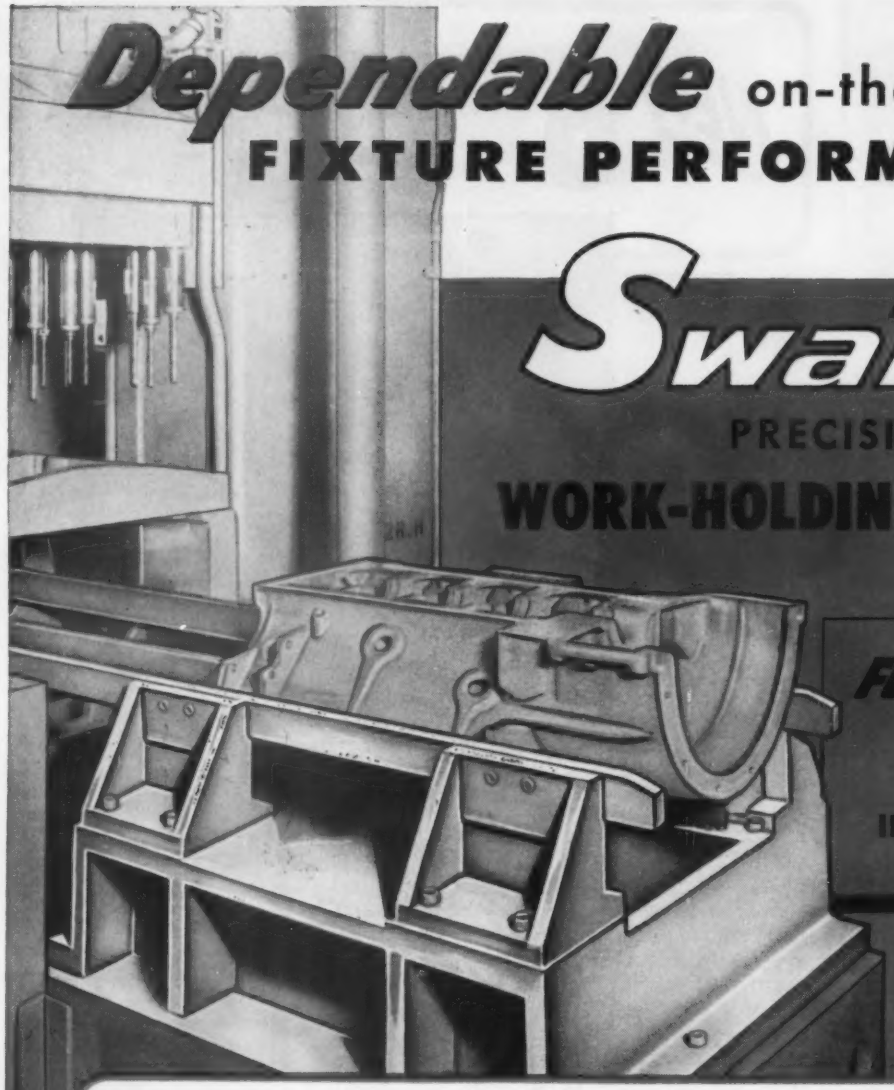
Name_____

Firm_____

Address_____

City_____ Zone____ State_____

Dependable on-the-job FIXTURE PERFORMANCE!



Swartz

PRECISION

WORK-HOLDING FIXTURES

FOR AUTOMATIC
TRANSFER
and
INDEX MACHINES

It's the dependable on-the-job performance of Swartz fixtures which sums up the many advantages Swartz service provides both buyer and builder of automatic machine tools. That's why Swartz fixtures were specified for this special 14-station Transfer Machine.

More than 30 years of seasoned experience and know-how, together with modern fixture-building facilities, are back of the Swartz specialized fixture-building service. It is an out-of-the-ordinary service, complete in every detail, with a number of distinct advantages . . . advantages it will pay you to investigate.

A Swartz engineer will gladly give you the facts, and point out the many ways this efficient, profitable service can be put to work for you.

WRITE TODAY FOR YOUR COPY OF THE NEW SWARTZ BROCHURE! THE INTERESTING DETAILS OF SWARTZ SERVICE ARE OUTLINED IN THIS NEW BROCHURE, "ADVANCING AUTOMATION," AND A COPY WILL BE MAILED ON REQUEST.

Designers and Builders of Precision Work-Holding Fixtures for More Than 30 Years

SWARTZ TOOL PRODUCTS
Division of Jefferson Corporation
13334 FOLEY AVENUE • DETROIT 27, MICHIGAN

we substituted a large magnifying glass, with a built-in light, for the plastic screen. The result was adequate protection and considerably better quality and faster work from the grinder. You can't do tricks like this with goggles.

I think there is a trend on the part of managements to begrudge every penny spent on safety precautions, but if they let their designers have a free hand at solving some of the danger problems arising in their plants, they would get better production as a bonus.

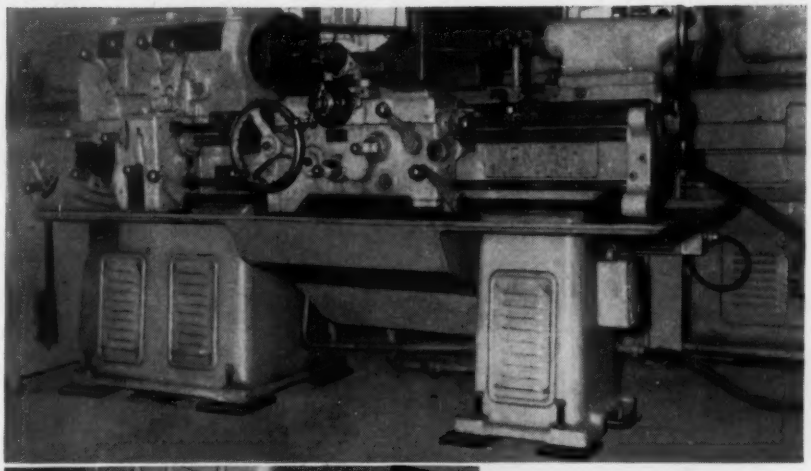
Mechanical handling has enjoyed widespread attention during the last few years, but only because it improved production. If the approach had been in the interests of increased safety, mechanical handling might have been adopted a lot earlier because less man-handling of weighty objects automatically increases operator safety.

Clifford T Bower
London, England

IF MANAGEMENT IS WILLING to spend money in providing safety equipment and reminders, and accidents still continue to happen, then I would say a "get tough" policy is quite in order and should be put in motion without delay. It is of no avail if every employee signs an employment blank providing certain penalties for failure to use safety equipment if the penalities are not enforced. To me it is just the same as Congress passing a law without teeth to enforce it.

The fact that this man, Bill Lacy, was a persistent violator of safety regulations, shows that having got away with it, not once, but several times, he considered himself above the law. For allowing him to harbor this delusion, the blame must rest squarely on Al's shoulders as a direct representative of management

"Feeling a little drowsy this morning, eh, Walters?"



Precision lathe mounted on new Type "T" UNISORB. Bottom photo shows close-up of machine base and use of UNISORB with leveling screws and steel plates.

New Type "T" UNISORB® Mounting Pads Used for Precision Machines...

For precision machines which must remain extremely level during operation, Type "T" UNISORB is now available. Like other types of UNISORB, this type reduces transmitted vibration and is used without bolting machines to the floor.

Condensed information about new Type "T" UNISORB Mounting Pads

Loading: carries loads of 75 to 125 lbs. per sq. in.

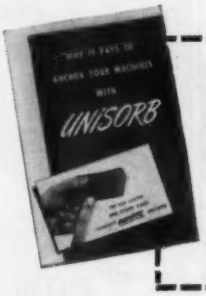
Thickness: ⅜" thick material with a greater density and firmness than other types of UNISORB.

Uses: include mounting of precision lathes, grinders, planers, jig borers, etc.

Resistant to petroleum products, mild acids and plant water conditions, Type "T" UNISORB provides a firm and durable mounting.

For the complete story about this new product and other types of UNISORB Mounting Pads, return the coupon today.

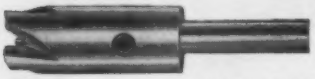
The **FELTERS** Co.
200 SOUTH STREET, BOSTON 11, MASS.
"FELT FOR EVERY USE"



RETURN COUPON NOW! Please send information about Type "T" UNISORB and the booklet "Facts About Anchoring Your Machines with UNISORB".

Name..... (Please Print) Title.....
Company.....
Address.....
City..... Zone..... State.....
Return to: The Felters Co., 200 South St., Boston 11, Mass.

Which



HOLLOW MILL

of these

STEP DRILL

multi-operation

COUNTERSINK

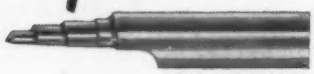
tools

COUNTERBORE

can short-cut

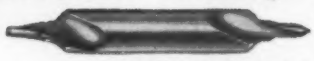
TREPAN

your



FOUR-STEP REAMER

machine time?



DOUBLE-ENDED STEP DRILL

Woodruff & Stokes design and produce small precision cutting tools to do, in a single operation, work often requiring as many as five separate machinings. Small, intricate holes of extremely close tolerances can be made quickly, easily, with W&S tools specially designed for each cutting problem. Let us tackle *your* problem—we may save you much valuable time.

WOODRUFF & STOKES CO., INC.
345 LINCOLN STREET
HINGHAM, MASSACHUSETTS

charged with seeing that safety laws were observed.

As a matter of fact no one has to be sold safety. The consequence of unsafe working practices to life and limb are too drastic to be taken lightly except by a careless few, who, in the words of the Bard, "Jest at scars who never felt a wound."

To bring people like this into line requires more than posters. In order to be saved from themselves they must be taught that safety rules have to be observed by everyone and that accidents don't just happen to the other fellow. I suggest a warning for the first infraction of safety rules, a week's layoff for the second, and discharge for the third offence. It is surprising how the average individual reacts to a blow in the pocketbook.

There is no question that the wearing of safety glasses provides a measure of eye safety in the plant. In companies where it has become a must, eye accidents have almost disappeared. One notable example of this is the Pullman Company where everyone from the president down wears glasses on the job.

For the man whose eyesight compels him to wear glasses on the job this is, of course, no hardship, as his optician can supply his prescription lenses ground from safety glass. Of course, in common with other technical advances, the makers of safety eyewear have kept pace with the trend. The crude "goggles" of yesteryear have been superseded by glasses that are light and comfortable to wear, as well as being engineered to provide maximum protection for the wearer's most precious faculty, eyesight.

I would say that the company whose policy involved the hiring of

"Who's the poet?"

NOW TWO TYPES OF CHALLENGE SURFACE PLATES

NEW!
CLOVIS BLACK GRANITE
Rated Class A.
Surface accuracy guaranteed.

FINE GRAIN SPECIAL ANALYSIS SEMI-STEEL
Precision ground or hand-scraped

STILL ONE STANDARD OF CHALLENGE QUALITY!

Semi-Steel Layout Surface Plates

High compressive strength . . . Low coefficient of expansion. 16 standard sizes, 6" thick — other sizes to order. Also available for sectional assembly into unlimited sizes.

Cast-Iron Top Work Benches

Four sizes, three styles. For individual use or on a continuous line. With self-contained storage facilities.

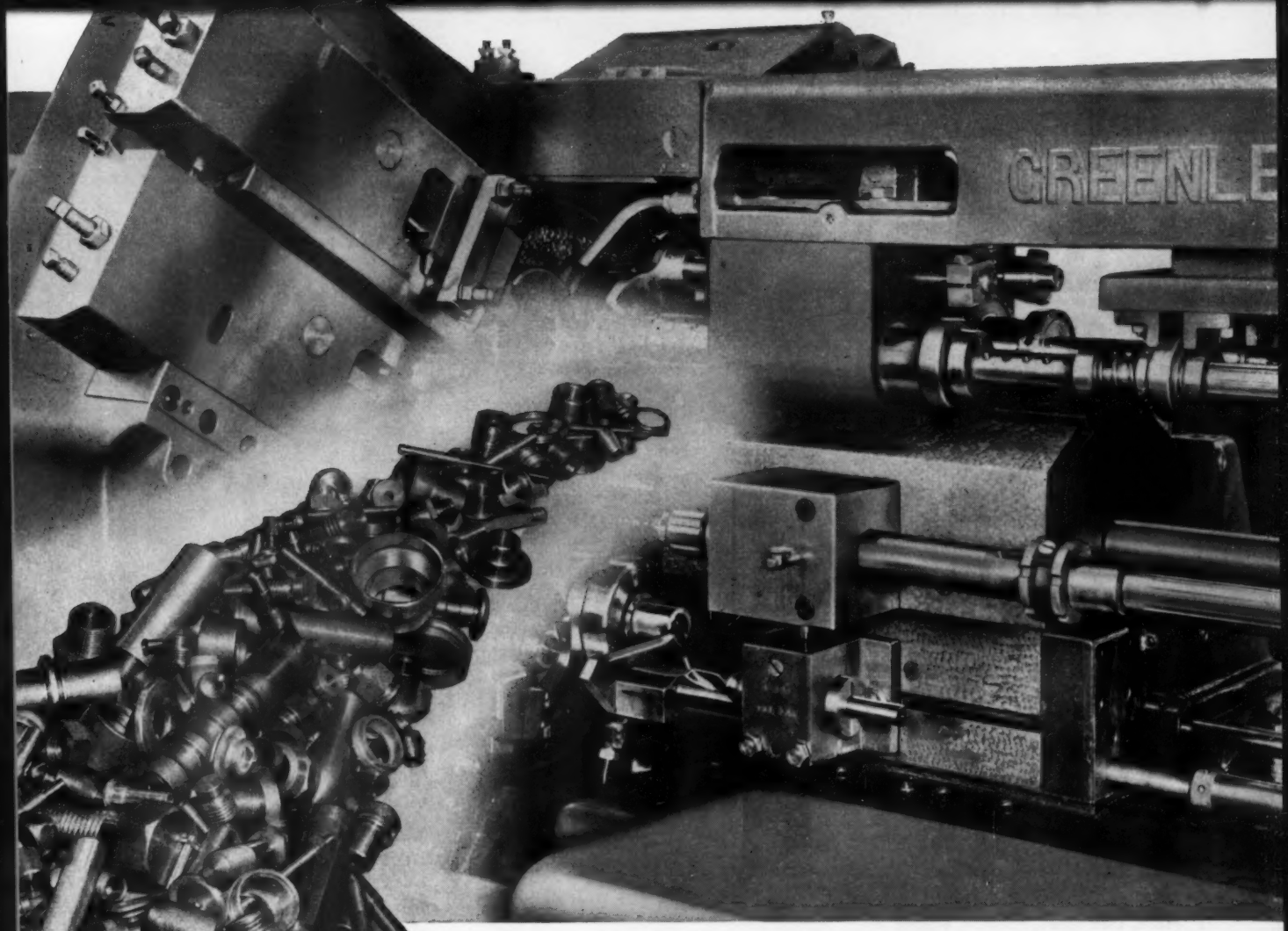
Other Challenge Precision Products:
Clamp Edge Layout Plates • Reading Tables • Lapping Plates • Welding Tables • Surface Plates • Bench Plates • Surface Plate Equipment.

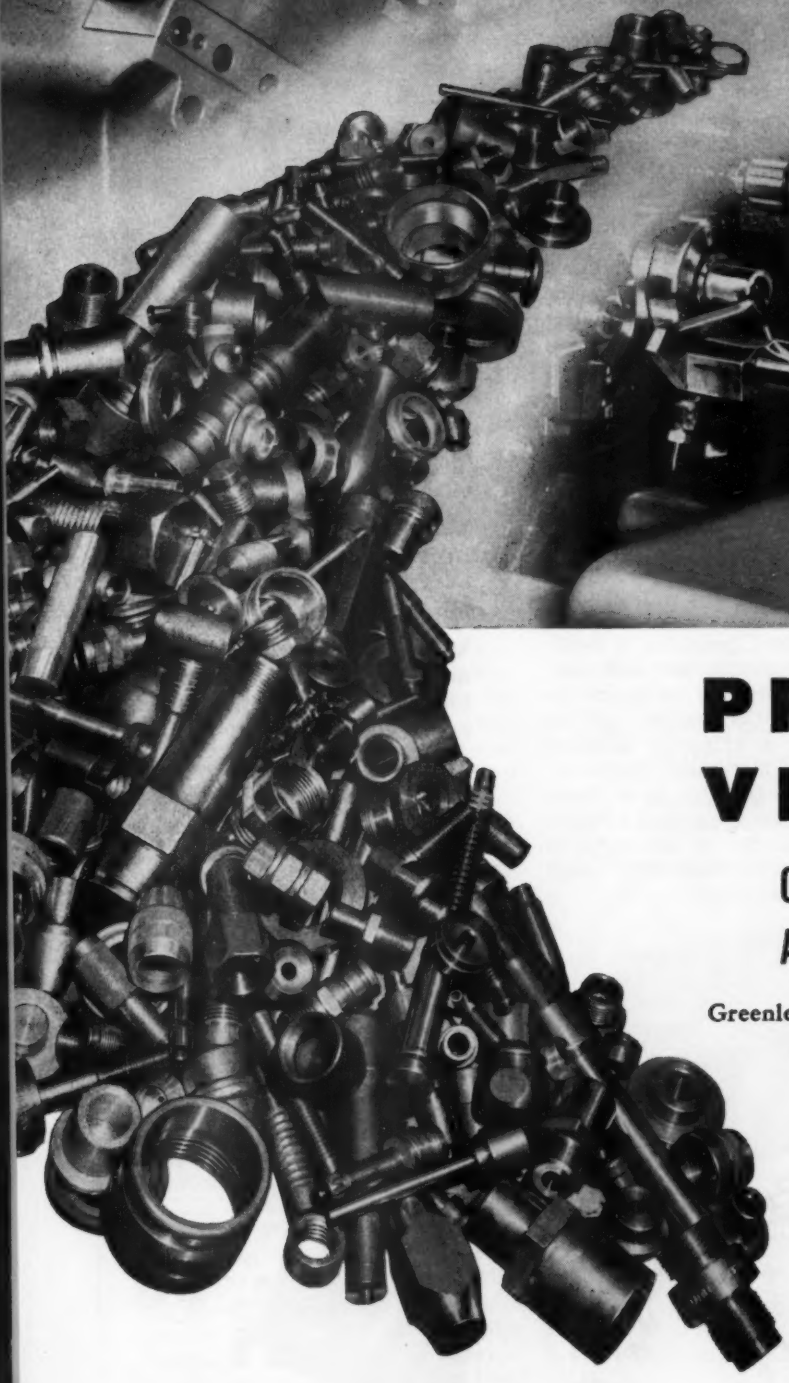
See the full line of Challenge Clovis Black Granite and Semi-Steel Surface Plates in the new Challenge Catalog. Send for your free copy today!

786

Challenge®

THE CHALLENGE MACHINERY CO.
Office, Factories and Show Room:
GRAND HAVEN, MICH.





PRODUCTION VERSATILITY

ON A GREENLEE 6-SPINDLE AUTOMATIC BAR MACHINE

Greenlee Automatics provide accurate and fast production of an almost endless range of parts. Standardized tooling, wide open tooling area, interchangeable cross-slide cams, built-in threading drive, rapid stroke-setting and other Greenlee advantages provide great versatility, assure a quick and generous return on your equipment investment.

PHONE ROCKFORD, ILLINOIS 3-4881
TO HELP SOLVE YOUR PRODUCTION PROBLEMS

PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
1723 MASON AVE.
ROCKFORD, ILLINOIS

ERIE

In the good old days

WHEN GRANDPA RAN THE BIG FORGING HAMMER

The days of the old-fashioned "Meller-drammer"

Grandpa and all the rest of his crew rode to work on a bicycle built for two. We put in a 60 hour long week . . . For 20 cents an hour wage, at peak . . . And, our boss, when things were going fine . . . For himself a 10 dollar check would sign!

Even then, Erie was THE GREATEST NAME IN FORGING HAMMERS

A 2000 lb. Erie Steam Hammer of about 1909

"IN OUR 60TH YEAR"
ERIE FOUNDRY CO.
ERIE, PA.

an optician to fit every man in the plant with safety glasses had made an investment that was certain to pay off. What is more important, they would protect their investment by seeing to it that there were no exceptions to the rule of wearing safety glasses on the job.

Robert S Alexander
Glastonbury, Conn

WE HAVE A LARGE FRAMED MOTTO hanging in a conspicuous place in our shop: "ONLY FOOLS IGNORE SAFETY RULES." But as is the case where the human element is involved, accidents happen despite all the framed mottoes and admonitions.

Sometimes while shooting the breeze with an oldtimer about wearing safety goggles, he will invariably come up with the now famous line, "I've worked 20 years and nothing ever happened to me, etc." But, the oldtimer forgets that it doesn't take 20 years for a piece of metal to leave the grinder and knock out his eye; it only takes a split second. Past experience should be a guide post, not a hitching post. But facts are stubborn things. It's still difficult to make a worker who uses an emery wheel without using safety goggles realize that he is in line for a white cane and a seeing-eye dog.

The use of personal protective equipment involves careful selection of the equipment, provision of facilities for distribution and servicing, and close supervision to insure its consistent use. Occupations such as metal cutting or chipping, handling fine or gritty materials, frequently cause particles to lodge in workers' eyes. Because the eye is such a highly specialized bundle of nerves it is easily injured by even very small

"He'd just given me a million-dollar contract when two guys in white coats came in with a straitjacket and took him away!"

IN TODAY'S forge shop

WHERE FASTER FORGING REQUIRES AN ALL-STEEL HAMMER

WHEN each hammergang's 'down time' is so costly if mechanical failure sets in,

WHEN competitive bidding in mass production requires every effort to be costed at minimum

WHEN product perfection must be taken for granted as buyers specify less and less tolerance allowances

The tireless performance of the all-steel construction (in all stressed parts, upper works, frames, and anvils) makes

ERIE, MORE THAN EVER, THE GREATEST NAME IN FORGING HAMMERS

50,000 lb. Erie Steam Hammer — the largest ever built

"IN OUR 60TH YEAR"
ERIE FOUNDRY CO.
ERIE, PA.

particles. In fact, microscopic particles often cause more harm than larger particles which may readily be removed. Goggles should be worn when carrying on such operations, and this requirement should be strictly enforced. However, with all the safety devices and rules in the world, if the average worker will pick up a mirror and look into it, he will see the world's greatest safety device—himself.

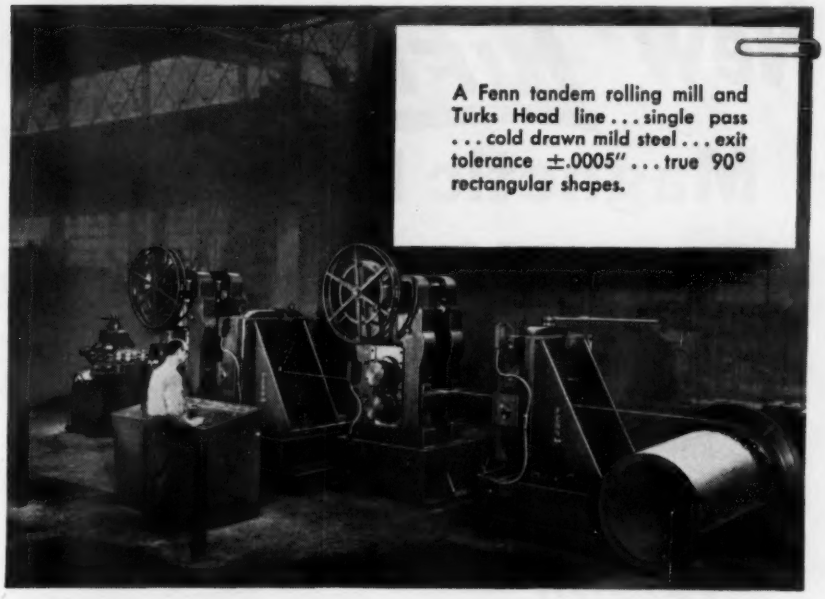
It's unfortunate that the only way some workers are impressed with the need for strict adherence to safety rules and the use of safety equipment is seeing an accident happen, due to carelessness and lack of compliance with the rules. I saw the result of an unguarded moment in one shop when a man working on a job, where the wearing of safety glasses was a must, sustained a serious eye injury. From the report of the accident it appeared that the worker had been complaining that the glasses irritated him, and apparently he did not wear them. The rest was a familiar story; another industrial eye accident, with its lost man-hours and idle time of the injured worker's machine. This worker was a key man, and a substitute meant slower production and increased rejects.

There is this to be said about safety glasses; they will irritate a person who has never worn them, or if they are not fitted properly. But they can be made quite comfortable and bearable. One plant I am familiar with has a licensed optician to fit safety glasses. But the average medium or small shops feel they can hardly afford the expense of the services of a licensed optician. Here the only solution lies in continuous supervision by the foreman to make the men safety-conscious and to constantly impress upon them the need to wear safety glasses, and to see that they do so.

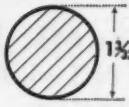
One plant I know of tackled the goggle problem by providing a "Better Vision" service station to make it easy for workers to keep their goggles clean and prevent accidents. In ordinary dispensers the company supplied a goggle cleaning fluid, and a roll of paper towels.

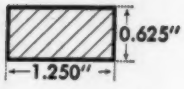
Many firms use different methods to make workers use goggles. There are various devices which force the worker to put them on before starting his work. For example, goggles may be attached to a switch which may not be turned on until the worker removes the goggles; this is used effectively on grinders, especially.

The foreman and worker can do their part in carrying out safety rules



A Fenn tandem rolling mill and Turks Head line . . . single pass . . . cold drawn mild steel . . . exit tolerance ±.0005" . . . true 90° rectangular shapes.

change 

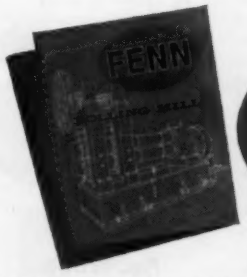
to 

in a single pass

- Can you make these and other shapes from round, in one pass, at speeds up to 2000 fpm?
- Can you hold tolerances of ±.0005" over 500 miles of stock, without regrind of dies or tools?
- Can you make an infinite number of squares and rectangles on the same set of dies?
- Can you make true squares and rectangles with sides 90° from top and bottom?

You can, if you own a Fenn line of equipment, made up of machines selected to suit *your* requirements*.

* Precision Rolling Mills — Turks Heads — Wire Shaping Mills — Swaging Machines — Accessories.



FENN

The Fenn Manufacturing Company • 155 Fenn Road, Newington, Connecticut

How can I save by using your Rolling Mills ☐, Swaging Machines ☐, Turks Heads ☐?

*Name*_____ *Title*_____

*Company*_____

*City*_____ *Zone*_____ *State*_____

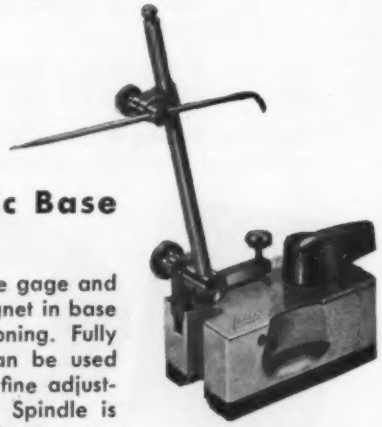
New LUFKIN Magnetic Base Tools Speed Your Work

LUFKIN

MITI-MITE Magnetic Base FLUORESCENT LAMP with magnifier

High intensity lighting (500 foot candles at 3" working distance) coupled with 4-power magnifier. Burn danger eliminated . . . unit operates at about body temperature. The two 5" lamps are protected by a plastic chip shield. Easily adjusted goose neck with full swivel at base. Heavy duty permanent magnets in base . . . attaches firmly to any round or flat ferrous surface. Ideal for industrial laboratories, tool rooms, die shops, bench inspection, surface grinding, precision lathe work, etc.

No. 350X



LUFKIN

MITI-MITE Magnetic Base SURFACE GAGE

May be used as both a surface gage and indicator holder. Permanent magnet in base can be turned off for easy positioning. Fully adjustable spindle — scriber can be used below base when desired. Has fine adjustment screw for precise setting. Spindle is isolated from magnetic field. Comes complete with 4" and 7" spindles and indicator holder attachment.

No. 300B

BUY LUFKIN TAPES · RULES · PRECISION TOOLS FROM YOUR DISTRIBUTOR

350 **THE LUFKIN RULE CO., Saginaw, Michigan**
132-138 Lafayette St., New York City · Barrie, Ontario

and regulations relative to use of safety equipment, but management also has a responsibility. If industrial accidents are to be reduced, management must lead in the effort. Employees cannot be expected to use safe working practices unless their foremen insist upon it. A safety-minded foreman is unlikely to progress very far unless he, in turn, is vigorously supported by the topside. Unless the highest executives make it plain that they expect the plant to operate safely and that they will tolerate no violation of safety rules, they need not be surprised by a poor accident record.

As far as disciplinary action for failure to wear safety goggles, I believe that discipline as a means of controlling accident and health hazards is not a favorable method. Discipline is primarily a matter of self-control rather than punishment and, in the relations between management and workers, the punitive aspects are best subordinated to voluntary and willing participation in an enterprise requiring the cooperative efforts of all. Punitive action often defeats its purpose because of the resentment it arouses. Fines, temporary layoffs, demotions, and disciplinary transfers have all been used on occasion in an attempt to force workers to mend their ways, but the effectiveness of these tactics is questionable. Many concerns state in their shop rules that violation of certain safety rules shall be grounds for dismissal. There is no doubt of the potentially serious consequences of such violations but, if the rules are unenforced or unenforceable, these policy statements become meaningless. This encourages employees to disregard more and more of the plant rules.

The relationship between eye-accident prevention and efficiency is clearly seen when the results are more closely examined. Direct losses are easily identified: medical ex-

"I think I've been fired . . . When I put my card in the timeclock, it chewed it up and spit it out at me!"

pense, compensation costs, and overhead chargeable to these factors. Less often it is clearly understood that spoilage of materials, damage to tools and machinery, decreased productivity of injured employees, absenteeism and replacement costs incidental thereto, and costs of supervisory time are likewise costs of doing business which can be eliminated. On the basis of experience, I feel that the identification of efficiency and of organized safety work is so complete that it needs only demonstration to prove its value either to the large business organization or to the small one. In fact the loss of a key man or of valuable equipment may be a more serious blow to the small concern than to the larger one.

There is much evidence of the effectiveness of safety programs in reducing losses and increasing efficiency. One small plant I know of reported that a compulsory goggles program cost $1400 per year on a 4-year average period. In that time the eye losses prevented (as evidenced by smashed goggles, etc), saved the company a total of at least $8640 in compensation payments alone, these figures being based on accidents occurring before the program was put into effect.

Harry Kaufman
Philadelphia, Pa

THE PROBLEM OF SAFETY is one of great significance, for the toll which modern industry exacts in human life and limb can be measured only imperfectly. Even if statistics were complete, they could never tell the tragic story of human suffering and loss.

Through the years the accumulated losses resulting from industrial casualties, to which the public gives little or no attention, are said to exceed greatly the human cost of wars. This surprising statement serves to bring forcibly before us the staggering price which mankind has paid in human lives for the high development of the industrial system. Although many large, progressive corporations are now devoting considerable time to the solution of this great problem, the general public is still only partially cognizant of the tremendous economic and social burden which industrial accidents impose upon the community. It would seem, therefore, that in this, as in so many other problems of human relations in industry, the greatest hope for improvement lies within industry itself; and here, as in other problems, progressive, humanized management is the most im-

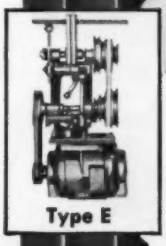
SHELDON
CHICAGO U. S. A.

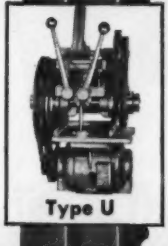
MORE POWER
at the Spindle Nose

The greater work capacity of 10", 11" and 13" Sheldon Precision Lathes comes in part from their extra power. Compared to other lathes of similar swing and price, Sheldon Lathes are built to take larger motors. Sheldon Motor drives are better engineered and better built. In place of a single ordinary V-belt to drive the lathe spindle, these Lathes have twin, Neoprene, cog V-belts (each capable of delivering 40% more power than an ordinary V-belt).

The greater wrap-around of Sheldon's twin cog V-belts not only delivers more power at the spindle nose—permitting heavier cuts, they also eliminate slippage at the spindle—increase accuracy of work. Made of oil, heat and static resistant Neoprene, Sheldons Spindle belts have a longer life expectancy than other belts of similar type.

Write for New G-55 Catalog


Type E


Type U

EM56B—with 4-speed Type E, Underneath Motor Drive in Cabinet base.

See our display at the Western Metal Show, Booth 614

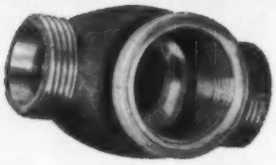
UM56P—with 4-speed external lever shift type U, underneath Motor Drive in heavy cast iron Pedestal base with storage space in tailstock leg.

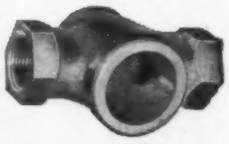
SHELDON MACHINE CO., Inc.
4234 N. Knox Ave. • Chicago 41, Illinois

TO CUT PRODUCTION COSTS...

More completely finished parts at the end of the day with no partly finished pieces lying around is the regular accomplishment of Goss & DeLeeuw "1-2-3" chuckers. It means complete finishing on one, two or three ends simultaneously or in sequence without tool resetting, rechucking or parts handling. Machining operations may include boring, facing, turning and threading.

Change over from job to job is simple. Cost-cutting is assured on long or short runs. Goss and DeLeeuw Chucking Machines are the only standard machines of their type which operate the "1-2-3" way to reduce costs per piece and step up the number of pieces per hour.





Investigate the opportunities offered by these machines on your production by sending samples of your work for time and cost estimates—Ask for illustrated descriptive literature.

GOSS & DeLEEUW
QUALITY PRODUCT-QUANTITY

GOSS and DeLEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A

mediate and most effective solution.

The reduction of accidents is fundamentally an internal problem of industry and as such constitutes a major responsibility of the employer. The attitude of management toward safety is, after all, the basic determinant of accident prevention. Wage earners can hardly be expected to give a sympathetic ear or eye to safety talk and posters if the employer is not doing everything within his power to make the physical conditions of employment safe. The ultimate success or failure of accident prevention, the attitudes of foremen and safety men, and the response of the rank and file of the workers will depend upon the point of view and conduct of chief executives and those who control company policies. Constructive results are always forthoming where the whole organization, from the board of directors and president down to the foreman is convinced of the value of safety and gives unstinted support to the work of the safety department.

In the prevention of accidents, as in the maintenance of production, the employer must delegate responsibility to plant superintendents and foremen whose cooperation with the supervisor of safety is an indispensable requirement for the success of the safety program. In the scheme of industrial supervision the foreman is the key man, because he is constantly in touch with the men on the job. He knows the men and the machines and the hazards attached to the work performed in his department. It is his responsibility to see that the hazards are reduced to a mininmum and that the men obey the safety rules.

Ernest Jones
Bronx, NY

SAFETY SHOULD BE A PART of everyday business. It is a part of everyone's business from top management down.

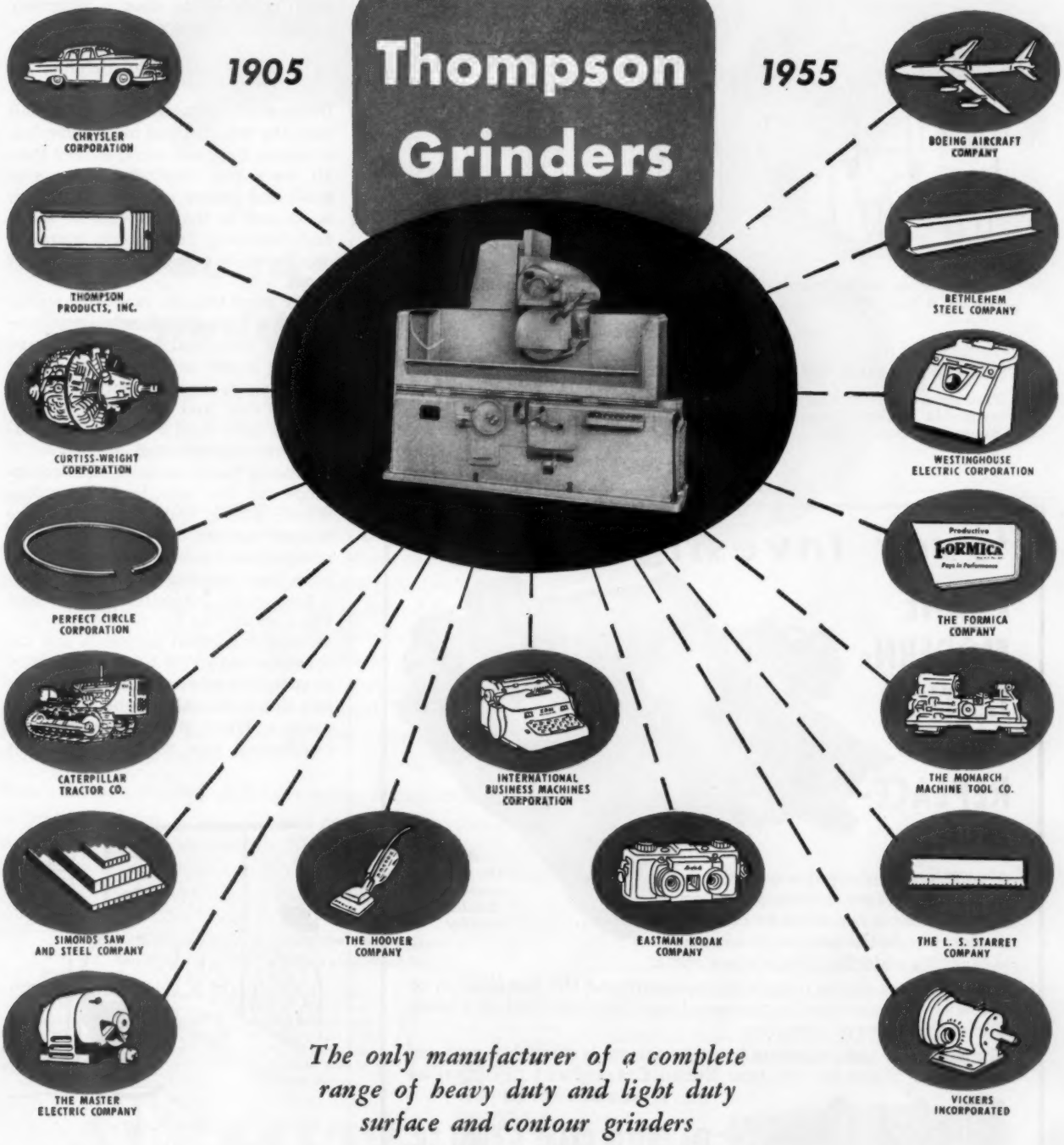
Good housekeeping has considerable bearing on the attitude of the worker toward his job. A good place to work is a safe place to work. Poor housekeeping makes the employee feel that if the company does not care, why should he?

A supervisor with an interest in safety and cleanliness usually creates the same interest in the workers. Safety should be a part of the new employee's training. Management should provide the best safety equipment for the employees, and rules should be set up for the use of this eqiupment. Once the rules are set up

Quality Speaks

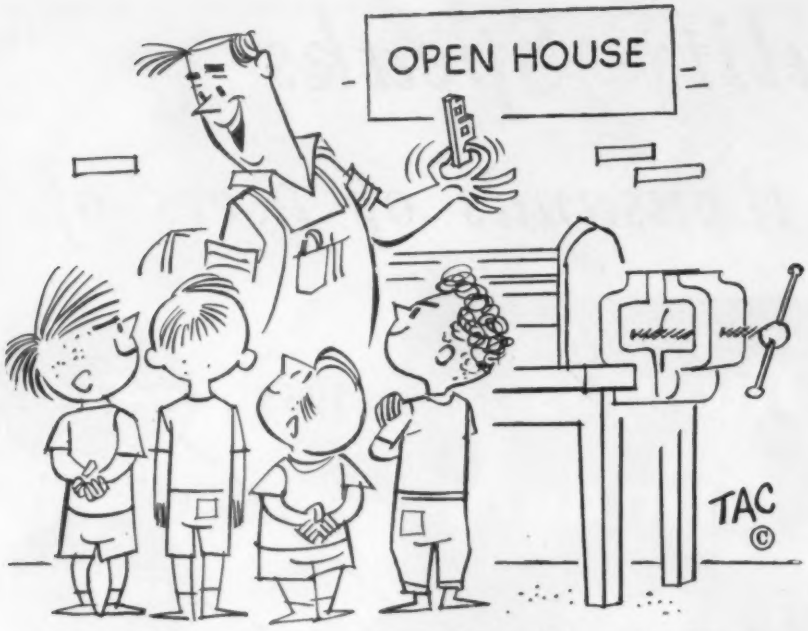
among the thousands of users of

1905 **Thompson Grinders** **1955**



The only manufacturer of a complete range of heavy duty and light duty surface and contour grinders

THE THOMPSON GRINDER COMPANY, SPRINGFIELD, OHIO



"...these dies are so tough even you kids can't destroy them. They're made of ATMODIE® air hardening die steel."

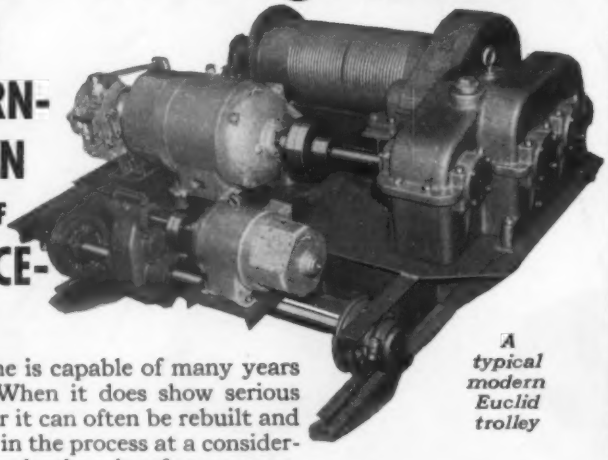
COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels — All types immediately available through Sales Offices, Warehouses and Representatives in Principal Cities.

TOOL COLUMBIA STEELS

'ever Investigate? . . .

CRANE MODERN-IZATION INSTEAD OF REPLACE-MENT

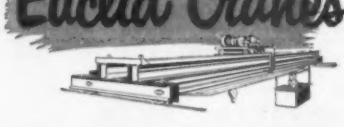


A typical modern Euclid trolley

A good crane is capable of many years of service. When it does show serious signs of wear it can often be rebuilt and modernized in the process at a considerable saving under the price of a new crane.

Crane bridges rarely require replacement and the installation of a new trolley can provide the very latest developments and most efficient features of operation.

The advice of our engineers in such matters is available without obligation. Write for the new Euclid Catalog and call upon us if we can be of service.



The EUCLID CRANE & HOIST Co.
1367 CHARDON ROAD
CLEVELAND 17, OHIO

in writing, every man is responsible. Anyone breaking the rules should be placed on a 30-day probation. Practice must be in line with policy, or you have no policy.

Lost-time accidents are costly to the firm and employee alike. Lack of interest in safety and indifference to it result in carelessness and lead to accidents. Any shop can be a safe place to work by serious intention, sincere effort, and intelligent direction. Safety in the shop is definitely an aid to quality production.

A E Salmons
Philadelphia, Pa

INDUSTRIAL ACCIDENTS, if taken all over the world, cause more suffering, economic loss, and social misery than all wars put together. Every war must end sooner or later, but there is no end to the accidents in shops and factories, nor should there be any recess in measures taken against them.

For more than 20 years this writer has been actively taking part in preventing industrial accidents. I have written many articles to point out the dangers in different industrial occupations, and in gathering material I have used both English, German and the Swedish languages.

Among the most dangerous equipment for the eyes is the grinding wheel. Flying chips should also be looked out for. In the power press many operators' fingers and hands have been crushed or chopped off.

The most influential people and those occupying key positions in preventing industrial accidents are the foremen and straw bosses, especially in such jobs where the accidents happen due to mistakes done by the operators. When planning new tools, purchasing new machines etc, it is

"Don't give this new man in the tool crib any lip! He's a big man!"

they found $27,000 in a puddle of oil...

It was easy enough to find a puddle of oil in this New England steel plant. 700 gallons of the expensive stuff ended up on the floor every week. It was wasted in the lubrication of massive bearings on their strip rolling mill. Housekeeping problems were terrific.

Then Alemite Oil-Mist was installed on one set of bearings for a test. The results were so immediate—so impressive, that this remarkable system was installed throughout the plant. It eliminated oil waste completely! Saved the 700 gallons of oil that had ended up on the floor every week—a matter of $27,000 a year!

Even more important were the savings effected in labor costs, downtime, and the reduced possibility of bearing failure. A major housekeeping problem and fire hazard was eliminated from the plant. No wonder management is delighted. Delighted, too, with the ease of Oil-Mist installation and the modest cost, repaid by savings in a few short weeks.

Here's the unit that brings these savings to any machine! This is the heart of the Alemite Oil-Mist system. It atomizes oil into tiny, airborne particles that are distributed to bearings through tubing. These particles form a continuous, uniform film of oil that both lubricates and cools the bearing surfaces.

FREE—the complete story of Oil-Mist—how it can bring these savings to any machine in your plant. Specifications, typical installations, case histories.

Three types of fittings allow the use of Alemite Oil-Mist on any bearing—any machine!

1. Oil-Mist fittings bring the most efficient lubrication in the world to roller, ball, needle—or any anti-friction type of bearing.

2. Oil-Mist Spray fittings are recommended for open and enclosed gears and chains. Allows for concentrated application where needed.

3. Oil-Mist Condensing fittings are applied to plain bearings, slides, ways, vees, cams, and rollers. Completely condense Oil-Mist.

ALEMITE
REG. U. S. PAT. OFF.

A PRODUCT OF SW STEWART-WARNER

Ask Anyone in Industry

ALEMITE, Division of Stewart-Warner, Dept. C-34
1850 Diversey Parkway, Chicago 14, Illinois

Gentlemen: Please send me complete information on Alemite Oil-Mist. No obligation, of course.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

Now... A Screw-Machine-Feed that BREAKS THE TIME BARRIER!

Steps Up PRODUCTION to the Continuous Flow of the FOURTH DIMENSION: TIME

EVERY TIME a screw machine cuts air... every time feed fingers are adjusted or replaced... every time remnant removal forces a shut-down — *that's time lost forever, never again to be made up in the production quota!*

In the modern Lipe Automatic Magazine-Loading Bar Feed, we present a continuous-feed mechanism that utilizes *every minute* of the working day for production...and still more production.

There's *No* cutting air. *No* feed fingers. *No* remnant problem. *No* minimum or maximum run. *No* limit on length of feed. *No* selective stock length requirement.

There IS a definite increase in production — up to 100% on some installations — *at least 30% on every one!*

Send today for FREE BOOKLET giving full details on Lipe's AML Bar Feed — today's big advancement in screw machine stock feeding. We will also supply name of your nearest distributor.

LIPE ROLLWAY

Lipe-ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machine Tools

Syracuse 1, N. Y.

up to the engineers and tool designers to look into the question of protecting the workers by fencing in or closing the working area so that the operator cannot by absent-mindedness or carelessness get into such spaces.

In the present issue where Bill Lacy got hurt because he violated the goggle rule, I should like to know if he was a new man on the job and if Al had told him to put on his goggles before I can pass any definite opinion. Maybe Al is not sufficiently accident-minded to care about warning his men what to do to prevent damage?

Photos of Lacy put on the bulletin board will warn others, but if this is the only result of his accident, it is inadequate. The man himself should be exposed in front of the whole crew, and the foreman, superintendent, or even the manager should point out the risks encountered when not using goggles for this kind of work.

To engage a licensed optician to fit safety glasses to all the men does not protect anyone from running into accidents. Suppose they don't wear them anyway? And for men who don't use glasses because there is nothing wrong with their eyesight, it would certainly be an unnecessary expense. The way Lacy hurt himself shows he didn't perform his job from a safe point of view. Al should both tell his men how to do their work and very strongly demand that they use their goggles until they knew there was no escape from them, or until they got so used to them that they didn't mind putting them on.

I don't accept Al's statement that lectures and posters make no sense toward safety. They are necessary, but the foreman's personal agita-

Well Pottsman . . . I'm glad to see you were wearing your safety goggles when it happened.

tion is probably more effective. I don't think people should be fired to make the crew respect the safety rules. If some official regularly and seriously points out that all rules must be obeyed, everybody except a few fools present in every shop, will follow orders. Instead of canning folks for violating safety rules, their compensation in case of accidents may be cut, for instance 25% or more. This will make the violators sit up and take notice. Safety work is not a hopeless fight; many more accidents would occur if nothing was done to prevent them.

Isn't Ed mixing things up when he says that just a few minutes after a man has been told to get safety shoes he would drop an angle iron on his foot? Suppose he dropped it *before* he was told to get safety shoes, then Ed would at least be morally responsible, whereas, as it happened, he has done his duty in trying to prevent the accident.

Ed's suggestion that Al would neglect his regular work when fighting accidents shows that Ed doesn't know what a foreman's regular duties are. I suspect, however, that Ed means Al is tied down in his office with his paperwork. But if this is the case, Al should be relieved of his blanks and writings. A foreman's regular work should be to divide the jobs among his fellows and give proper instructions how to do each operation safely. He should always be present where something happens.

In Sweden the Industrial Accident Compensation Law says that if a man violates the safety rules, his compensation in case of accidents may be reduced. How much this reduction should be is decided after investigation by Riksforsakringsanstalten, which is the official insurance organization handling all industrial accidents in our country.

A E Fristedt
Stockholm-Bromma, Sweden

PLANT SAFETY is the responsibility of all concerned with plant operation and maintenance—shop men and management alike. In matters of personal safety, the truth is we are all gamblers by nature. From childhood on, we are all fond of taking risks. We find risks exhilarating, notably, when they come off, and in order to enjoy a thrill we go out of our way, sometimes unconsciously, to take risks. Now and then we throw caution to the winds, dare all and damn the consequences. How else could we have pioneers and trail blazers? Those who leave "footprints

it's yours for the asking—it's FREE!

Webber
CROBLOX Gage Block
(regularly sold for $12.62)
size .1005" (certified accurate to ± .000004")

Just send us your old .1005" rectangular block regardless of its age, condition, brand or material (steel or chrome plated).

Reason for this unusual offer is to prove to you, by actual use in your own shop, that Webber CROBLOX Gage Blocks (chrome carbide) are the finest, longest-wearing blocks made.

CROBLOX retains its accuracy many, many times longer than standard steel or plate. The .1005" size was chosen because in most shops it is subjected to the greatest amount of use, and therefore to the greatest amount of wear.

Have your quality control manager, chief inspector, tool room foreman, or an official of your company write us on company letterhead, authorizing this exchange. Then we will notify you when to ship your old .1005" block (requests will be filled in order received).

No cost to you—no obligation of any kind. We simply want to prove the superiority of Webber CROBLOX.

Webber
GAGE COMPANY
12901 Triskett Road • Cleveland 11, Ohio

LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS

McCROSKY

COST CUTTING TOOLS

CUT TOOL INVENTORIES

with

*Super Jack**

UNIVERSAL MILLING CUTTERS

Right Hand or Left Hand Rotation

Just One Body for . . . Cast Alloy or Carbide Tips

Positive or Negative Angles

Up to 4 times as many Blades as the Cutter Diameter

Unsurpassed economy for shops with short runs. Bodies can rotate in either direction. Blades are locked rigidly on radial center. Consequently, simply inserting blades of proper hand, angle and cutting material, permits a single body to be adapted easily to any job, metal and work condition. Face and Shell End Mills in a large range of stock sizes, also "Specials" for unusual requirements. *Write for Bulletin No. 531.*

* U. S. Patent 2,547,789.

COST CUTTING TOOLS **McCROSKY TOOL CORPORATION**

MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities

Jack-Lock® **MILLING CUTTERS**
Face Mills, Shank and Shell End Mills, Half Side and Staggered Tooth Cutters. Sizes to 24" in dia.

Super®-Adjustable **REAMERS**
Chucking and shell designs. Proven construction locks blades rigidly, producing smooth, concentric holes.

Special **PRODUCTION TOOLS**
Combine 2 or more related operations into a single tool, producing better products, quicker, and cheaper.

Universal **MILLING CUTTERS**
Bodies can rotate in either direction. Simply using blades of proper hand, angle and cutting material, meets any requirement.

ask us about . . .

Wizard® **QUICK CHANGE CHUCKS**
Tools are held centered and rigid. Operator can change tools without stopping or slowing down the spindle, increasing production and cutting costs.

Turret **TOOL POSTS**
Successive tools are swung into cutting position quickly, indexed accurately and locked rigidly, giving engine lathes the versatility of turret lathes. 5 styles, 9 sizes.

Block Type **BORING BARS**
Bore more pieces in shorter time, with greater accuracy. Stock sizes with straight or tapered shanks, with or without pilots, for holes up to 15" in dia.

in the sands of time" give little heed to personal safety and accomplish much. The John Smith's who make a fetish of safety first, die eventually and accomplish little.

This, of course, is not a plea for reckless conduct in the factory; rather is it a fear that extreme care may produce negative results. Extreme caution can induce fear, and were it possible for us to become so completely guarded and coddled as to be placed beyond reach of mishap, then indeed would we be in a parlous plight, then indeed would all worthwhile progress cease and with it, all significant production. Because of the spirit of adventure in man, the quest for complete safety is doomed to failure.

Most people, interested in the matter of industrial safety, hold that complete protection is impossible and that all that is required for management is to guard against the more serious dangers. They argue that if danger in industry could be completely eliminated, a generation of childlike, confiding workers would arise who would require to be escorted to and from their work, to and from the movies, to and from every place they visited, every time they left the shelter of their homes. They could not be trusted out of doors unless in the care of some reckless youth or adult who worked in, say, an office, a shop, a day school or some such dangerous occupation where callous employers paid scant attention to the preservation of their lives and limbs. They further argue that people who live dangerously learn to take care of themselves and who can gainsay that, unless in the

"He says his wife wanted to use the lift truck today."

new! ADVANCED ENGINEERING FEATURES

new! EXTRA-HIGH FLOW RATES

new! QUICK-OPENING LIDS

announcing

A COMPLETE NEW LINE

of HONAN-CRANE

OIL FILTERS

. . . the first in a series of important engineering developments by the **NEW** Corporation . . .
HOUDAILLE-HERSHEY OF INDIANA, INC.

"F" type Full Flow

Designed for in-line installation at extremely high flow rates—25 to 800 GPM. Features low pressure drop—only 4 PSI across unit at 170 SUS. Uses new "FLO-PAC" pleated paper cartridge, removes particles down to one micron.

"B" type Bulk Refill

For applications where oil must be kept absolutely clean . . . bulk Cranite medium provides depth purification. Bulk or cartridge type cellulose refills are available for fine filtering . . . permitting "custom" filtration.

"M" type Multi-Cartridge

Available in eleven sizes with six different types of cartridge filter elements to give exact degree of filtration needed. New "FLO-PAC" and "KLEER-PAC" cartridges feature exceptionally high efficiency—large dirt holding capacity.

All models have new Quick-Opening Lids

Purifier lid is fastened with swing bolts which one man can loosen quickly. Lid swings back for easy access to refills.

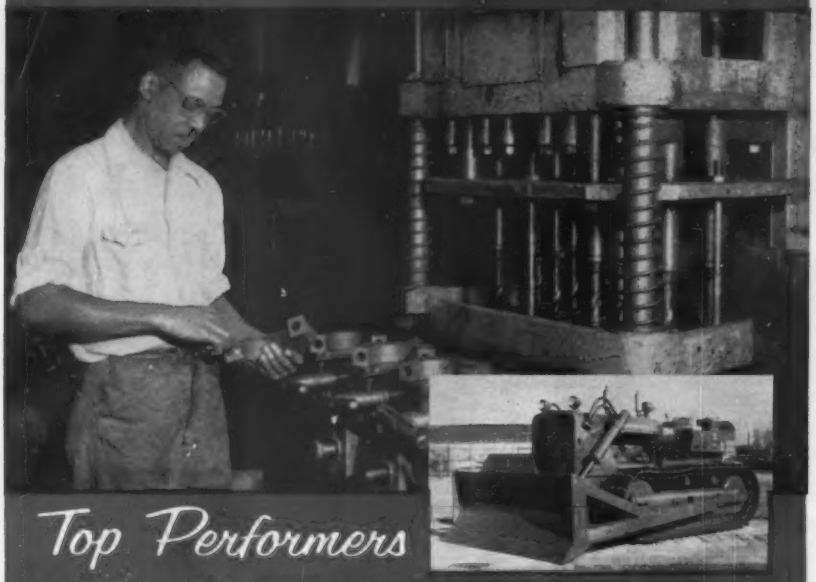
WRITE FOR ENGINEERING BULLETINS AND QUOTATIONS ON ALL THREE MODELS.

HH of Indiana

HOUDAILLE-HERSHEY OF INDIANA, INC.
FILTRATION DIVISION

205 WABASH AVENUE, LEBANON, INDIANA

W&B *Carbide Drills and Reamers...*



Top Performers
FOR TRACTOR MANUFACTURER

Whitman and Barnes drills and reamers are used on many tough production operations by a well known tractor manufacturer to secure more pieces per hour, more holes per grind and longer tool life. Illustrated above is an operation utilizing carbide drills on cast iron crankshaft bearing caps. These standard 13/16" diameter W & B carbide drills are run at 290 R.P.M. and a feed of 2-1/8" per minute. It was found that high speed steel drills burned badly on this job with resulting short life. Comparatively, W & B carbide drills not only provided more holes per grind, thereby reducing down time, but increased tool life to over 10,000 holes, 2-1/2" deep. For top performance and rock bottom costs in drilling and reaming you can't beat W & B. 4282

Call your W&B distributor for best service and highest quality

He can save you money by supplying from his stock . . . what you need when you need it!

"Makers of Fine Tools Since 1848"

DRILLS, REAMERS COUNTERBORES
W&B

Please send me additional information

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

WHITMAN & BARNES

PLYMOUTH ROAD • PLYMOUTH, MICHIGAN

NEW YORK CHICAGO LOS ANGELES ATLANTA

case of people of low IQ, or the mentally deficient.

Shortly before writing this I had been looking through a works magazine and, reading through the new appointments and retirements, I was tickled to note the following "John Tott, junior foreman, after fifty years service." Safety first must have got John when he was very young, don't you think? I fancy he was taking no risks. I am prepared to believe he never had so much as a scratch!

The grocer who whitewashed his shop windows, leaving only a peephole, must have been acutely aware of the perversity of human nature. Above the peephole he pasted a bill which, in large characters, read *"Don't Look in Here."* The inevitable happened; hundreds flocked to "look in" till the police had to intervene in the interests of traffic flow. There is a moral here for fervent safety firster's.

The fact that the men won't use facilities provided by the company for safer working should be taken account of when a claim for compensation comes up. If neutral opinion is satisfied that carelessness for his own safety, and refusal to make use of facilities provided to promote that safety, contributed to or was the cause of accident to a given man, compensation should be graded accordingly. Ed's suggestion to sack anyone who flouts safety rules would be a deterrent and, in time, would pay for its keep if it became standard practice in industry. Assuredly, such action would be resented by the men. That would be all to the good, and would focus attention more sharply on the evil than posters and slogans. I always feel that foremen

"That's why I hate this place. ALWAYS have to make DECISIONS!"

When shipments were slow, the kindly old boss
Would let the help know that this made him cross

But now it's made plain so that shippers don't guess
They're told with each order, "Send it RAILWAY EXPRESS!"

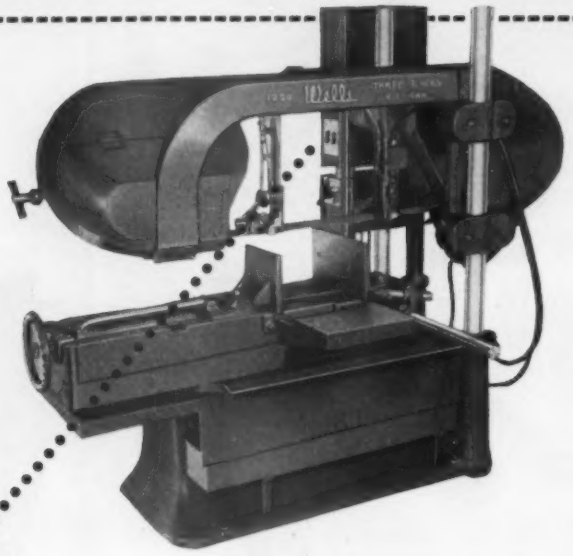
The big difference is

Speed, economy, and safe, sure delivery—
that's the big difference it makes
when you specify Railway Express!
Whether your shipment is big or small,
whether it moves by rail or air,
you'll get cheerful, convenient, and
fast service . . . because Railway Express
works to please you in the finest
American tradition of free enterprise.

RAILWAY EXPRESS AGENCY

. . . safe, swift, sure

NEW EASE OF CONTROL WITH THE WELLS MODEL 1200 METAL CUTTING BAND SAW



CONVENIENT FINGER-TIP CONTROLS now operate at 110 volts

The Wells Model 1200 is a rugged, new horizontal band saw for heavy-duty production cutting in any shop. The Model 1200 incorporates all the proven advantages of the Wells No. 12, plus such outstanding advancements as "Feather Touch" Finger-Tip Control and greater safety with *110 Volts at the controls.* Metal cut-off actually becomes a preferred job with this machine because operation is so easy. In addition to ease of operation, the Model 1200 has the versatility to handle big jobs or little jobs with efficient, economical, fast and accurate action.

Flip a switch and the Model 1200 becomes a completely automatic machine with continuous operation for duplicate cutting when used with a Wells-O-Bar Feed Master stock projection unit.

Check the following select features and then request Job Engineering assistance on your specific cutting requirements.

Select Features

APPROVED ELECTRICAL SYSTEM
110 VOLTS AT CONTROLS
OVERLOAD AND LOW VOLTAGE SAFETY
NEW HYDRAULIC UNIT
AUTOMATIC CUTTING CYCLE
NEW BLADE PRESSURE CONTROLS
SPECIAL CHIP FLUSHING UNIT
NEW HEAVY-DUTY BLADE GUIDES
FOOL-PROOF BLADE TENSIONING
NEW POWERFUL COOLANT UNIT
RIGID POSITIVE STOCK STOP

DESIGN DETAILS

- Large Capacity—Rounds, 12¾"; Rectangular, 12" x 16", 11" x 18".
- For Die Blocks: Clearance bed to blade, 18". Permits 12¾" depth cut of large blocks.
- Selective Speed Range: 60, 115, 200, 300 ft. per minute.
- Ample Motor Power: 1 H.P. Blade Drive; ⅓ H.P. Hydraulic System.
- Parallel to bed cutting action.
- Adjustable stops for depth cutting.
- Automatic frame return and shut-off.
- Shipping Weight: Approximately 1950 lbs.

See us at Booth 559
Western Metal Exposition

Wells SAWS
Wells

The Pioneers of Horizontal
METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
505 ROOSEVELT RD., THREE RIVERS, MICHIGAN

and charge hands could reduce the accident rate by keeping a strict eye on the accident-prone and giving a timely word of advice.

The accident free or almost free, need no safety supervision, posters, or slogan. They attend, instinctively, to safe working and while nothing will ever prevent occasional accidents, even among them, their mishaps are usually slight and well remembered. They seldom make the same mistake twice and safety officers can afford to trust to their good sense.

Eye injuries at machines could be almost wiped out by fitting transparent shields—adjustable—totally enclosing the cutting tool. We should dispense immediately with the use of the word "goggles;" it's hideous and, as I stated on a previous occasion, most of the goggles are too. In addition to totally enclosing shields at machines, all metal workers should be compelled to wear protective glasses and each man should be fitted with glasses as suggested by Al. Attractive design and comfortable fit would be a big step forward and the advice and attention of a professional man might conceivably induce the men to *want* to wear them, which, in the interests of safety, is what should be aimed at. Most shops of significant size have a doctor and a nurse on the staff; an occulist would not be an insupportable burden on the payroll, and might prove to be the answer to the problem.

Today it is compulsory, by legislation, that employers provide effective safeguards for their employees. It is also compulsory that parents see their children educated. Perhaps the time is now ripe for legislation compelling workers in the metal trades to use the safeguards provided for their protection.

C Donald
Lanarkshire, Scotland

"With your head of steam you'd think it was YOU that had to run 12 blocks in a nightgown!"

New Books . . .

MECHANICAL WORLD YEAR BOOK 1955. *Published by Emmott & Co, Ltd, 31 King St West, Manchester 3, England. 554 pages, 4×6 in. Price 3/6 (50¢).*

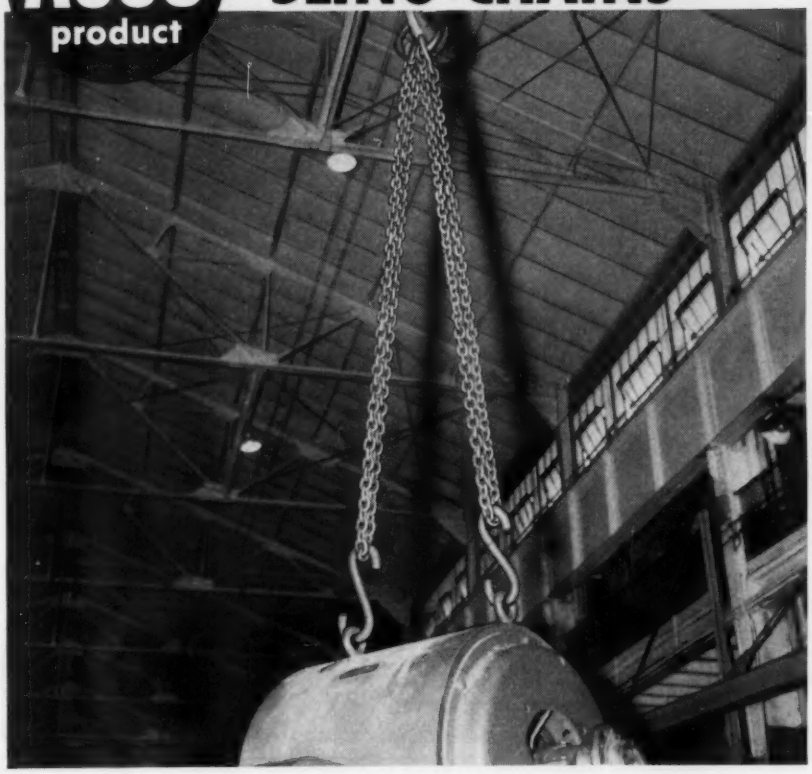
In producing a new edition of this standard reference work every year, the publishers are faced with a continual problem of deciding what to include or omit. This year's edition omits the review of the development of steam plants, a feature of last year's edition, and changes are mostly in the nature of a rearrangement of the material. The section on engineering materials has been consolidated to bring all types of materials, together with related information on heat treatment, die casting, and hardness testing, into one place. This is a decided improvement in that it makes for greater convenience of reference and comparison. Detail revision of other parts of the book has also been carried out.

HOLES, CONTOURS AND SURFACES — *Published by the Moore Special Tool Co, Inc, Bridgeport, Conn. 424 pages, including 450 photographs and working drawings and 184 pages of Woodworth circular tables for converting holes on circles to rectangular coordinates. Priced at $7.50 per copy, but sold within the metalworking industry at a special price of $5 in USA and $6 elsewhere.*

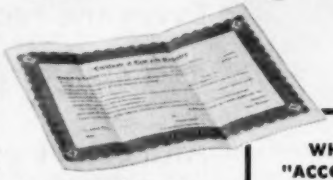
Here is the sequal to Moore's famous "Precision Hole Location," published in 1946 and now out of print. That book concerned itself only with jig boring and jig grinding of holes, whereas the new volume describes subsequent developments in the field of hole location and embraces con-

an ACCO product

ACCO Registered* SLING CHAINS



You get more than chain when you buy ACCO Registered Sling Chains



• This 125,000 psi ACCO *Registered* alloy sling chain has great strength, yet it's lightweight and easy for men to handle. It will lift a variety of expensive loads safely over costly machines. You can be sure of that because it's ACCO *Registered.*

ACCO *Registered* is more than a name. It's more than a registered trade mark of American Chain & Cable. It is the standard by which all other slings are judged. It means that you can equip your shop with dependable "lifting tools" specifically designed for highest efficiency and long life by trained engineers who spend all their time designing and testing slings.

A survey of your sling requirements will cost you nothing. See your ACCO *Registered* Sling Chain distributor today or write our York, Pa., office for details. *Trade Mark Registered

WHAT "ACCO REGISTERED" MEANS . . .

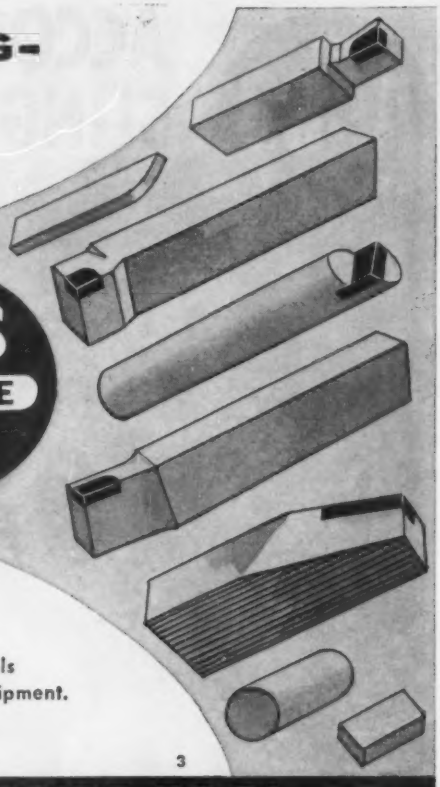
1 The best material
2 Unit safety factor (on bodies, rings, links, hooks)
3 Proof test of complete sling to twice the working load limit
4 Actual field service test of each design
5 Metal identification ring on each sling
6 Signed Registry Certificate with each sling

ACCO American Chain Division
AMERICAN CHAIN & CABLE

York, Pa., Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

plus Rings Links Hooks

EVERYTHING—
from Soup to Nuts
in Tungsten Carbide



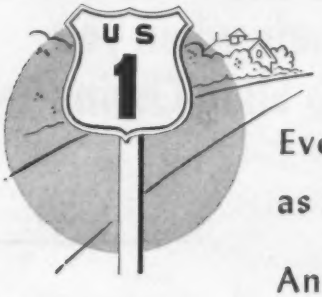
WILLEY'S
TUNGSTEN CARBIDE
TOOLS

Special tools are our specialty. Send specifications or prints for prompt quotations and delivery dates. Standard tools carried in stock for immediate shipment.

Write for Catalog

3

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan



Everyone recognizes this as a sign of going places . . .

And smart gear users know this CINTI is the sign of the best in gears made to *your* specifications.

May We Send You Our Brochure?

CINTI®
"Gears...Good Gears Only"

THE CINCINNATI GEAR CO. • CINCINNATI 27, OHIO

tours and surfaces as well. Also, the book introduces a new process — linear form grinding.

Purpose of this book is to provide engineered solutions for the toolmakers' most serious problem: the accurate location of holes, contours and surfaces. That is why the subtitle reads "Located, Machined, Ground and Inspected by Precision Methods." A representative selection of work-pieces is used to illustrate the principles and practices described in the book. And in addition, the reprinting of the Woodworth tables is a feature that alone is well worth the price.

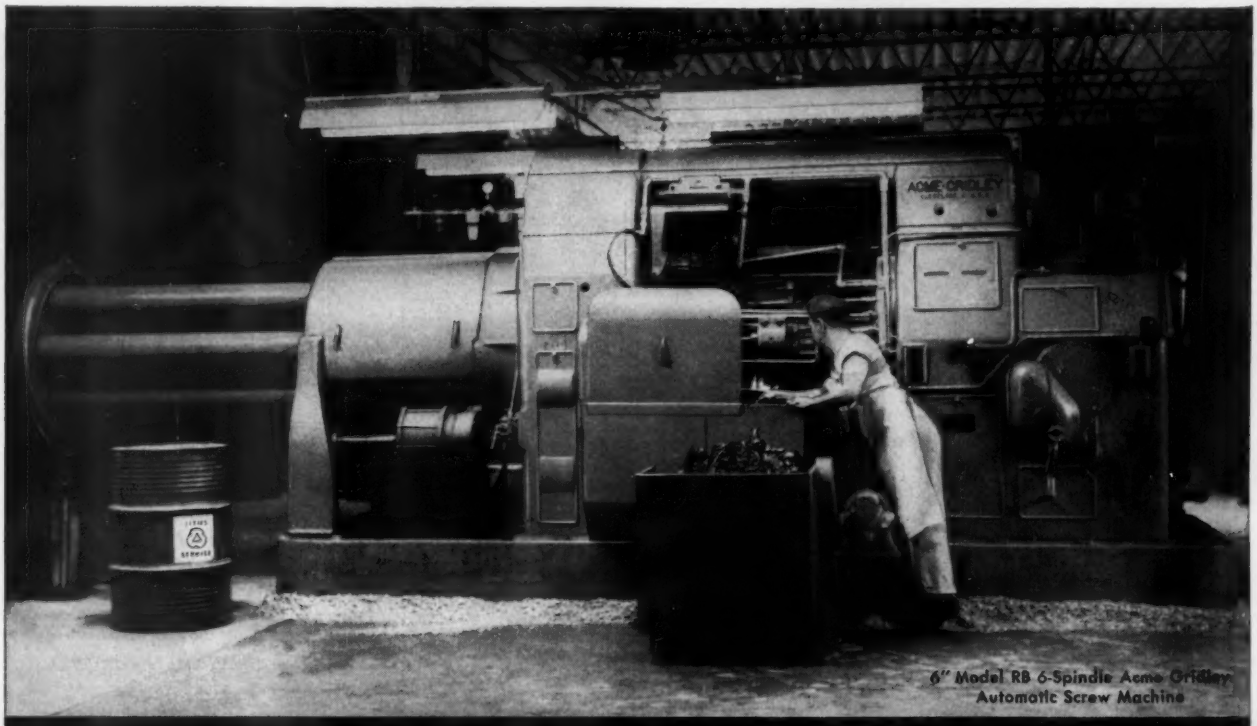
Like its predecessor, "Holes, Contours and Surfaces" is bound to become a classic to the man or shop that does accurate work.

DIRECTORY OF WELDING AND FABRICATING EQUIPMENT. SECTION 1, METAL-ARC WELDING ELECTRODES. *Published by Louis Cassier Co, Ltd, Dorset House, Stamford St, London SE 1, England. 35 pages 11½×8½. Paper cover. Price 3/6 (50¢).*

Reprinted from *Welding and Metal Fabrication*, this constitutes the first comprehensive guide to the entire range of electrodes available in the UK. It permits the user to see at a glance the details of every British electrode for welding any metal currently used in the fabricating industries.

The book is divided into five parts, covering respectively the electrodes for mild steel, alloy steels, hardfacing, cast iron, and nonferrous metals. Electrodes are grouped under the name of the manufacturer, and the main details are given for each,

"The best I've been able to do is make it easier to shut off when the trouble recurs."



6" Model RB 6-Spindle Acme Gridley Automatic Screw Machine

ONLY 5 MORE LIKE IT IN THE WORLD!

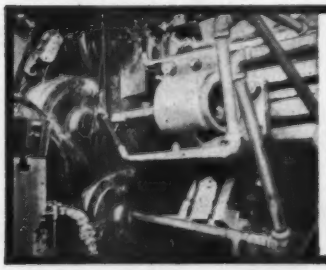
Owned by Jessen Manufacturing Company, today's most advanced automatic screw machine uses Cities Service Cutting and Hydraulic Oil

Weighing 39 tons and powered by a 60 H.P. motor, this 6-inch, 6-spindle Acme Gridley Automatic Screw Machine is one of the only six now in existence . . . and the only one owned by a job shop. Featuring a combination pneumatic-hydraulic operation, it can turn out a single load of stock weighing 3 tons!

The owner is Jessen Manufacturing Company of Elkhart, Indiana—since 1923 famous for keeping on top of new developments. It's not strange, therefore, that for this advanced new machine they chose a top quality coolant—a Cities Service cutting fluid.

Says President J. H. Jessen: "We're happy to say that the Cities Service cutting oil we use today is one of the finest all-around cutting oils we have ever used. In years past, we felt that if a cutting oil was good, it had to be black, heavy, and odorous. Cities Service has changed our minds with a cutting oil that has outstanding cooling abilities, good chip drain-off, is anti-weld . . . and yet possesses light, clear color and has no noticeable odor. In addition, Cities Service Pacemaker Oil used in hydraulic systems, and Amplex Lubricating Oil are doing an outstanding job throughout our shop. We proudly recommend *all* these Cities Service Oils."

For more information on the complete line of Cities Service cutting fluids, call in a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.



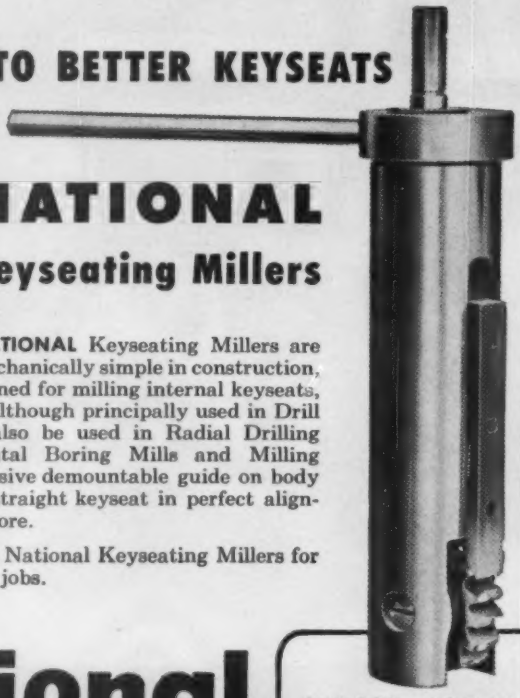
Light, Clear Coolant in Acme-Gridley Automatic is Cities Service cutting oil. "Outstanding cooling, anti-weld, and chip drain-off ability," says Jessen. Firm also praises Pacemaker Oils, used in their hydraulic operations.

Jessen Mfg. Company., Inc. Mr. Jacob Jessen, Pres., in business since 1923, has earned reputation of keeping on top of new developments. In 1935, he was one of the first to install 6-spindle, anti-friction bearing screw machine.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

THE KEY TO BETTER KEYSEATS



NATIONAL
Keyseating Millers

NATIONAL Keyseating Millers are mechanically simple in construction, sturdiily built, designed for milling internal keyseats, faster and better. Although principally used in Drill Presses they can also be used in Radial Drilling Machines, Horizontal Boring Mills and Milling Machines. An exclusive demountable guide on body of Miller assures a straight keyseat in perfect alignment with axis of bore.

You can depend on National Keyseating Millers for all your keyseating jobs.

national
MACHINE TOOL CO.
CINCINNATI 22, OHIO

WRITE TODAY
for Catalog No. 17
complete, handy size

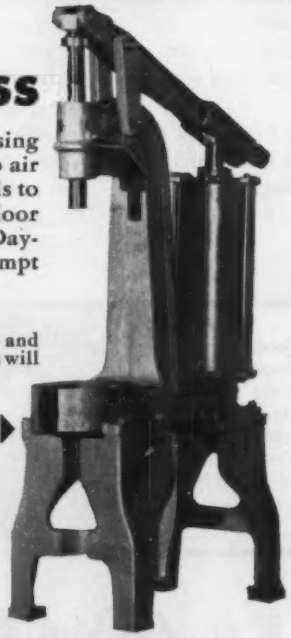
SAVE!

WITH A
HANNIFIN AIR PRESS

It's the ideal press for that occasional pressing job. These presses operate off ordinary shop air supply. They're fast and safe. Over 30 models to choose from...many for either bench or floor mounting. Capacities from ½ to 18 tons. Daylight to 46 inches...reach to 12 inches. Prompt delivery.

WRITE. Complete information and prices on Hannifin Air Presses will be sent on request.

6 Tons (Model B-2) One of more than 30 models. Press with base, $554.



1-ton Hand-D-Press. For small parts manufacturers. Press, $232.

Prices F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

HANNIFIN

HANNIFIN CORPORATION, 517 S. WOLF ROAD, DES PLAINES, ILLINOIS

together with any special features. Where color coding is employed, this is noted for quick recognition. Also given are the recommended welding position and the British Standard Classification.

PROJECTS IN METAL FOR HOME AND SCHOOL SHOP—*Published by The James F Lincoln Arc Welding Foundation, Cleveland 17, Ohio. 80 pages, 8½×6, paper cover. Price 50¢ in US, 75¢ elsewhere.*

The increasing popularity of the Do-It-Yourself movement has inspired Lincoln to bring out this interesting little book filled with practical projects for hobbyists and school shops. With simple-to-use welding outfits now readily available, and with the aid of the clearly presented, dimensioned sketches in the book, it is an easy matter for the average handyman to construct virtually any metal object, from a home-heating plant to a child's toy tractor.

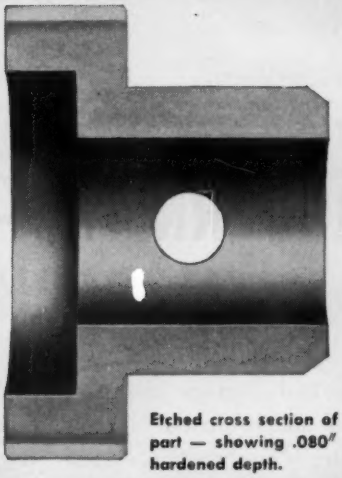
The book's contents have been taken from a larger book published by the Foundation, *Farm Arc Welding*, but the projects are by no means confined to farm use. They can be applied to any home, whether in the city or the country.

SAFETY IN INDUSTRY — *By D I Macfarlane. Published by Iliffe & Sons Ltd, Dorset House, Stamford St, London SE 1, England. 71 pages, 8¾ × 6, paper cover. Price 7/9 ($1.10)*

There is a large and steadily growing volume of literature on the subject of industrial safety, but it is safe to say that there can never be too

"It's a good thing we have Blotky working for us . . . without his help we'd never have a Fire Drill."

COSTS CUT 94%



Etched cross section of part — showing .080" hardened depth.

with TOCCO* Induction Heating

A cost reduction of 94% resulted when heat-treatment of this Corn Harvester part was changed from carburizing to TOCCO-hardening. Look at the unit cost breakdown:

CARBURIZING		TOCCO-*Hardening*	
Degrease	$0.0020	*eliminated*	
Carburize	0.0200	*eliminated*	
1st quench	0.0150	TOCCO, heat and quench	$0.0060
2nd quench	0.0150	*eliminated*	
Draw	0.0050	*eliminated (self-draw)*	
Shotblast	0.0035	*eliminated*	
Internal Grind	0.0243	*eliminated*	
External Grind	0.0166	*eliminated*	
	$0.1014		$0.0060

"—Savings of 9½ cents per piece—$4770.00 on each 50,000 piece batch, *plus* an hourly production increase from 120 to 300 pieces per hour, *plus* improved quality of the product by virtue of the deeper case and stronger core."

Have you investigated TOCCO's cost-savings possibilities for your hardening, brazing, melting or forging operations? Why not write us today or send blueprints of your parts —no obligation, of course.

THE OHIO CRANKSHAFT COMPANY

TOCCO

Mail Coupon Today

NEW **FREE** BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. B-3, Cleveland 1, Ohio

Please send copy of "TOCCO Induction Heating."

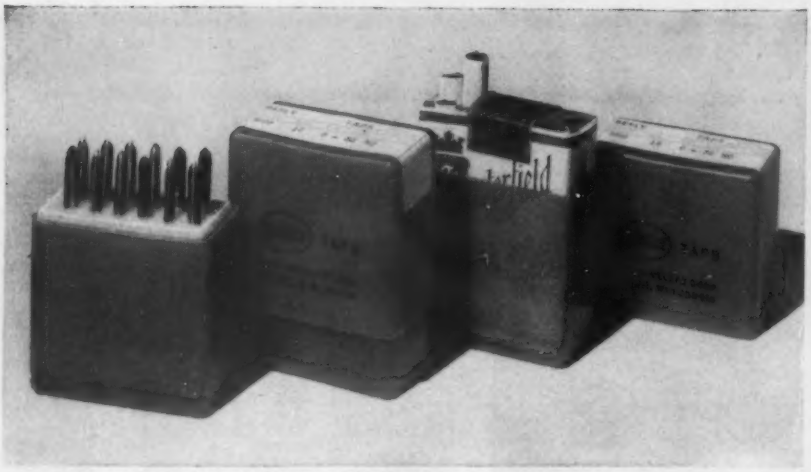
Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____



New Besly Tap Package not only protects taps from damage, but can also be re-used to hold cigarettes, fish-hooks or other small tools.

MODERN TAP— MODERN PACKAGE

Now, Besly Tap quality is protected by a unique plastic "slip-together" case. It's so resilient it can be dropped or banged about without harming the taps inside. A plastic foam filler holds the taps firmly in position to prevent damage during shipment and storage.

Used to hold taps 0-80 through 5/16" in size, the new case even makes identification easier. It comes in different colors which indicate the type of tap inside. Orange is used for high speed ground thread taps, red for high speed cut thread taps and white for carbon taps. An easy-to-read label on the top gives size, quantity, etc. The case is oil and grease resistant, is easily cleaned and will not deteriorate.

This new case is one more example of the greater quality you get when you order Besly Taps. Their accuracy at all vital points assures better threaded holes, faster cutting and longer life. But don't just take our word for it — see for yourself. Ask for a trial in your own plant — on the type of material you ordinarily tap. This is one trial that can mean big savings for you in machine time and tool costs. Call your Besly Distributor or write:

BESLY-WELLES CORPORATION
120 Dearborn Ave., Beloit, Wisconsin
Established as Charles H. Besley and Company in 1875
Branch Offices & Warehouses—Chicago, Detroit, Cleveland

much. And this new book is a worthwhile addition to the list. Industrial safety, like love, knows no boundries, and its language is the same in all countries, but it is interesting to observe it from the British standpoint. Many of the techniques suggested follow closely along American practice, but the chapter on punch press safety shows protective devices carried much further than is customary in this country.

References to cutting fluids as "suds" may be a little confusing to American readers, and the names of safety equipment manufacturers will be unfamiliar, but the book makes good reading for everyone interested in the subject. One chapter —unfortunately much too short— concerns a problem of growing importance in this country but on which far too little has appeared in print, namely, the protection against ionizing radiation.

Other chapters cover dust and fume control, guarding rotating machinery, press guards, dermatitis, eyes, protective clothing, lighting, and flooring.

NEW FILMS

INDUSTRIAL ALBUM—Produced by *Frederic B Stevens, Inc, Detroit 16, Mich. 16-mm, black & white, sound. Running time 26 min. No charge.*

Featuring automatic barrel plating and processing in an automated line, the major part of this new film was made in the Elgin plant of Illinois Tool Works' Shakeproof Div. The operational economy of automatic barrel zinc and cadmium plating, bright dipping, rustproofing, and washing operations is described. In addition to the finishing operations,

"It's two minutes past five . . . you're annoying me on my own time."

Steel-Weld FABRICATION

Use WELDED STEEL for Greater Strength with Less Weight!

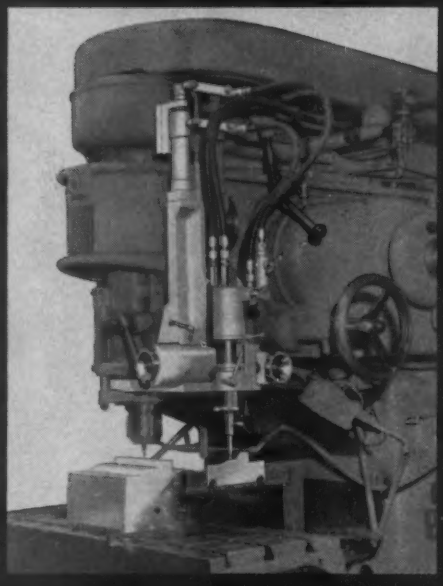
Illustrated above are four of fifty-eight columns fabricated, machined and assembled by Mahon for a well known press manufacturer. These and the parts and assemblies illustrated at left are typical of thousands of Steel-Weld Fabricated units produced and machined by Mahon for manufacturers of processing machinery, machine tools, and other types of heavy mechanical equipment. If you use weldments, or if parts of your product could be produced to better advantage in welded steel, you will find in the Mahon organization a unique source with complete facilities for design-engineering, fabricating, machining and assembling. Send prints for fast action, or have a Mahon engineer call to discuss your requirements. A Booklet showing Mahon facilities and examples of superior craftsmanship will be forwarded on request.

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN

Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON

Make your Pratt & Whitney Mill
a 4 in 1 Performer
with GOODRICH HYDRAULIC
Duplicators
at
LOW COST



Hundreds of new milling operations are now possible with time and cost-saving GOODRICH DUPLICATORS. Pratt & Whitney mills gain new versatility with this rugged, custom-designed, rigid tracer DUPLICATOR attachment.

1 **TEMPLATE TRACING**— exact copies of complex contours are quickly traced from master templates of rigid material. A support bracket mounted on cross slide leaves table free to travel. Narrow template frees table area for work.

2 **POWER FEED BORING** — a boring control feature provides power feed to the head with infinite feed from 1" to 30" per min. The tracer-finger or micrometer stop is utilized for semi-automatic boring operations.

3 **MASTER DUPLICATING**— contours are traced from any 3-dimensional model with work and model mounted on table. Simplifies set-ups by 2-way horizontal and 1-way vertical adjustment of Duplicator unit.

4 **STRAIGHT MILLING**— unlike many duplicators, the GOODRICH HYDRAULIC DUPLICATOR interferes in no way with regular hand controls for straight milling of contours, bosses, etc. Shuts off quickly and is easily swung aside.

Send for booklet A-1 for full information

AUTOMOTIVE SERVICE TOOLS, INC.
Division of Lansing Die Sinking Co.
617 May Street Lansing, Michigan

the straight-flow processing from cold headers to finished product is shown.

THE FOREMAN DISCOVERS MOTION STUDY—*Produced by University of California Extension (Educational Films Sales) Los Angeles 24, Calif. Running time 16 min. Black & white or color. Sale price $150 color, $67.50 b & w. Rental price $5 color, $3 b & w.*

Here is a motion picture designed to introduce plant foremen, supervisors, and students to the field of motion study and work simplification. By a story situation it shows the experience of a typical foreman as he first comes into contact with motion study.

The production is designed to create an affirmative attitude toward the whole field of motion study, rather than to teach the actual principles.

NEW HORIZONS IN ALUMINUM BRAZING. *Produced by Aluminum Company of America. Running time, 22 min. 16-mm, color, sound. Available without charge from Association Films Inc, Ridgefield, NJ (Broad at Elm), Chicago (79 E Adams St), Dallas (1108 Jackson St), and San Francisco (351 Turk St).*

Replacing an older film, "How to Braze Aluminum," this new presentation covers furnace, torch, and dip brazing. It describes the process, demonstrates the technique, and discusses the use of each process. A thorough demonstration of brazing applications to production operations is presented, and a sequence outlines the advantages of brazed construction for fabricated parts. The services of Alcoa's process development laboratories are described.

("Fore!")

"Solved! ...The case of the rusty fingerprints"

On one of his periodic visits to a large piston ring manufacturer, Sinclair Lubrication Engineer Don Rigg ran into a peculiar rusting problem. Mr. Rigg reports, "Customers were returning a considerable number of the company's rings because of rust spots and *rusty fingerprints*. Observation of the manufacturing process showed the rings were dipped in a rust preventive oil after being machined, then they were packaged and stored. *The fingerprints could only have come from the packers* and were due to failure of the rust preventive."

Mr. Rigg continues, "I recommended the use of Sinclair RUST PREVENTIVE 142 because it imparts a tough, protective film, impervious to finger marks and metal to metal contact. The fact that this company switched to Sinclair RUST PREVENTIVE 142 and has been using it exclusively for 3 years is ample proof of results."

SINCLAIR LUBRICANTS

Why not give a Sinclair Lubrication Engineer the chance to help solve *your* rust and lubrication problems. *There's no obligation.* Contact your local Sinclair office or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

GENERATED HELICAL ROD

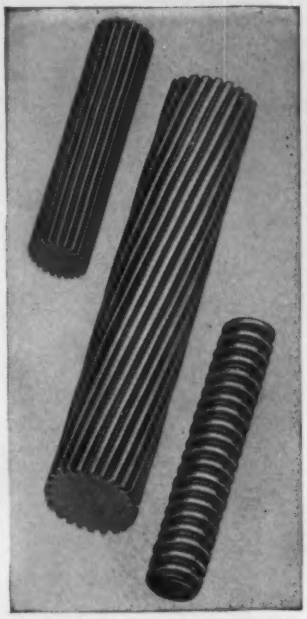
Mass Gear can generate spur, helical and worm pinion rod in all types of material including plastic.

Mass Gear can also produce any type of serrated or special form rod that can be generated.

These rods are available up to 6 feet in length, from 5/32" to 1 ¼" in diameter.

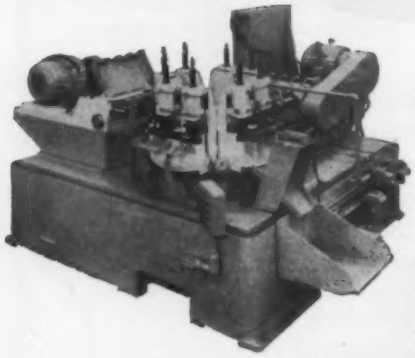
Mass Gear products are made to A.G.M.A. standards, thus insuring uniform quality.

Illustrated brochure showing interesting designs and suggestions available upon request.



Massachusetts Gear & Tool Co.
WOBURN, MASS.

Precision Pumps for Precision Machinery



Hartford Special Drilling Machine Equipped With a Ruthman Gusher Coolant Pump.

RUTHMAN GUSHER
Coolant Pumps

Gusher Coolant Pumps are precision built of the finest materials. The rotating shaft is electronically balanced to cut vibration wear to an absolute minimum. The motor is totally inclosed and drip-proof. The heavy-duty ball-bearings are pre-lubricated. You can specify Gusher Coolant Pumps for your precision machinery with the sure knowledge that they will give you efficient service at low maintenance cost.

THE RUTHMAN MACHINERY CO.
1818 Reading Road Cincinnati, Ohio

SKF Spherical Roller Bearings—*Produced by SKF Industries, Inc, PO Box 6731, Philadelphia 32, Pa. 35-mm slide film, sound color.*

Particularly suited for designers of heavy industrial equipment, production executives using antifriction bearings, and engineering society audiences, this new film gives a quick, visual demonstration of the improved Type C spherical roller bearing, for which longer service life and up to 50% increased capacity are claimed. Development stages leading to the improved characteristics are presented, and the principles of hydraulic mounting and removal are demonstrated. These latter techniques were developed by SKF for large bearing applications in steel mills, paper-making machinery, crushers, and other rugged equipment.

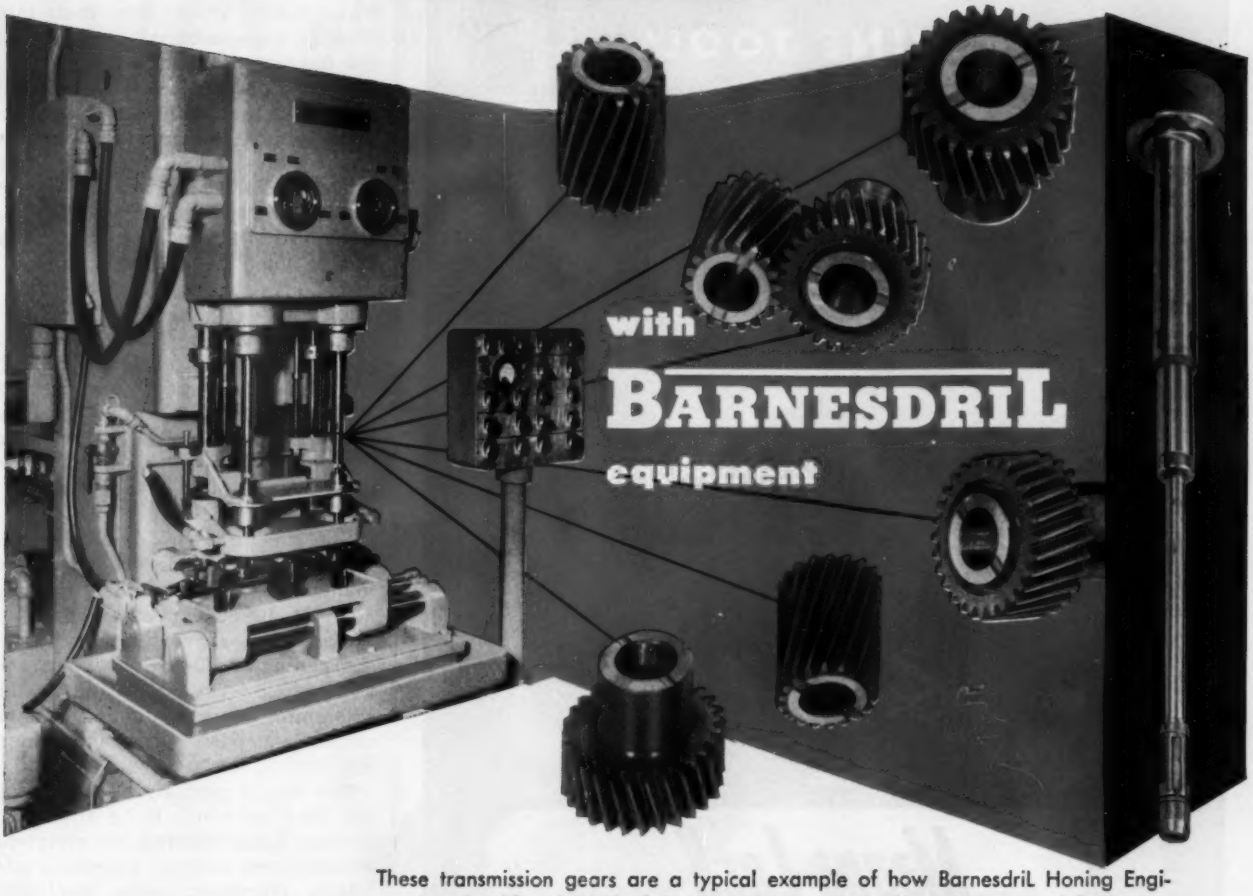
Welding Advances with Aluminum—*Produced by Aluminum Company of America. Running time 28 min. 16-mm, color, sound. Available without charge from Association Films Inc, Ridgefield, NJ (Broad at Elm), Chicago (79 E Adams St), Dallas (1108 Jackson St), and San Francisco (351 Turk St).*

Described as an "interim report," this new film describes modern developments in inert-gas and shielded-arc welding of aluminum. It deals with both the tungsten arc and the consumable electrode processes, including the basic welding techniques for these methods. An animated sequence explains how metal is joined. Examples of welded fabrication of aluminum, such as tanks and pressure vessels, are presented, and the automatic welding and production engineering assistance provided by Alcoa are covered.

"Thank goodness . . . that's done for the week!"

when the HOLE business is a problem

TRY HONING..

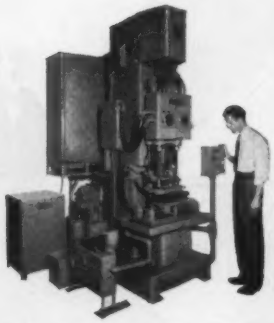


CONTROLLED ACCURACY

CONTROLLED FINISH

These transmission gears are a typical example of how BarnesdriL Honing Engineering simplifies the hole finishing process and supplies accuracy and finish control. Completely automatic control provides bore-to-bore accuracy within .0005", stock removal of .0025", and 10 R.M.S. finish.

Electronic Hone Expansion on this No. 223 2-spindle Honing Machine maintains proper pressure between the stone and work for maximum rate of stock removal, with controlled geometric accuracy of roundness and taper. Because the stone is supported at the cutting edge with controlled feed pressure, longer abrasive life results, with less downtime on the machine for stone replacement.



Plugmatic Sizing provides the most accurate sizing method available, sizing the bore directly with a positive gage. The sizing member cannot be affected by either misalignment or eccentric stone wear, accounting for complete interchangeability of parts finished.

When you have a hole finishing problem, call your BarnesdriL representative, or write . . .

HOLE BARNESDRIL FINISHING

BARNES DRILL CO.

830 CHESTNUT STREET • ROCKFORD, ILLINOIS

Get the advantages
of magnetic chucking...
FOR BENCH WORK
...FOR SMALL
MACHINE TOOLS

Magna-Lock
ELECTRO-MAGNETIC CHUCKS

These small chucks—5″ x 10″, 6″ x 12″, 6″ x 18″, 10″ x 15″ working surfaces—eliminate costly fixtures, give you all the features of the larger Magna-Locks: 22% more magnetic area than other types, rugged welded *all-steel* construction, dependable moisture-proof, shock-proof electrical circuits. Complete standard accessories available.

Get details, DEPT. AM-35

Request Magna-Lock as *original* equipment on your new machines.

Hanchett MAGNA-LOCK CORPORATION
Magna-Lock
Magnetic Chucks and Devices
BIG RAPIDS, MICHIGAN, U.S.A.

MOTION PICTURE FILM CATALOGUE OF THE PLASTICS INDUSTRY. *Published by the Society of the Plastics Industry, Inc, 67 W 44th St, New York 36, NY. 12 pages, 8½ × 11. No charge.*

This is a useful, comprehensive listing of motion pictures covering various phases of the plastics industry available for public showing. Subjects range from raw materials, through manufacturing processes, to the finished product.

A brief description of each film is given, together with the terms, conditions, and the company or agency from which the film may be obtained. Where films are specifically aimed at a general audience, such as women's clubs, schools, or churches, this is noted in the description.

SHOPWORK — *Produced by McGraw-Hill Book Co, Text Film Dep't, 323 W 42 St, New York 36, N Y. Correlated with the textbook* SHOPWORK, *by Jones. Filmstrips (6), 35-mm, silent, black and white. Price per strip $5.50, set of six $30.*

Set No. 1 of this two-set series contains six strips intended for manual-arts and vocational-training courses, and covers: care and repair of hand tools; sharpening hand tools; sharpening and using auger bits and twist drills; sawing, planing, and smoothing wood; laying out common rafters and open stairs; and soldering.

Set. No. 2 contains an additional six films covering: filing and hacksawing; blacksmithing, oxyacetylene welding and cutting; pipework and simple plumbing; using electricity safely; electric arc welding.

Each filmstrip contains clear, concise captions and step-by-step instructions on the subject covered. The related textbook can be used to great advantage with these films.

"When you get to the 'Help Wanted Column,' I'd advise you to look them over!"

an AIR engineering FIRST

New ANGLE WRENCH with unmatched Torque Control

Ingersoll-Rand introduces a brand new concept in torque control in angle wrenches. This sensational new development shuts off automatically and completely—it does not continue to build up torque.

The New Torque Control Angle Wrench runs series after series of nuts or cap screws to the same tightness . . . eliminates the inaccuracies of former angle wrenches.

- **Easy Adjustment**—quickly and easily adjusted to produce any torque within the selected range.
- **More Durable**—than any previous angle type nut runner. New "valve type" torque control mechanism is less vulnerable to wear . . . more economical to maintain.
- **Minimum Torque Reaction**—transmitted to operator, regardless of torque setting . . . for the life of the tool.
- **Seven Sizes** — to choose from—torque range from 5 to 90 foot pounds.

size 38MT

Ask your Ingersoll-Rand AIRengineer to demonstrate the new I-R Torque Control Angle Wrench . . . phone him today . . . or write for more information on this new development.

8-188

Ingersoll-Rand

11 Broadway, New York 4, N. Y.

"Constant Quality" Tungsten Carbide From The World's Newest Carbide Plant

VALENITE

New methods . . . fresh ideas . . . specially designed equipment . . . top carbide engineers . . . three years of thorough planning and perfecting to bring you *"CONSTANT QUALITY"* TUNGSTEN CARBIDE.

Valenite's performance has been proved by long runs on some of the country's toughest cutting jobs. It has what it takes to stand the gaff, hour after hour, day after day.

Valenite will show you on your production line what "Constant Quality" can save you in time and money.

Write for Valenite's complete catalog of "Constant Quality" carbide tips and tools.

Please send without charge the new Valenite Catalog—A-5

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

VALENITE

METALS CORPORATION

Box 205 • Royal Oak, Michigan

Names in the News . . .

W C Scott has been elected executive vice president and general manager of Outboard, Marine & Manufacturing Co, Waukegan, Ill. **Curtis Morris,** president of RPM Manufacturing Co, a subsidiary, was elected a vice president of the parent company. **J L Rayniak,** vice president of Outboard, has been appointed to the newly-created post of general manager of the company's Johnson Motors Division.

The Frank G Hough Co, Libertyville, Ill, manufacturer of Payloader tractor-shovels and towing tractors, promotes: **G A Gilbertson,** vice president in charge of sales, advertising and service, to executive vice president and general manager; **R L Beyerstedt,** vice president and chief engineer, to executive vice president in charge of engineering and product development.

Scovill Manufacturing Co, Waterbury, Conn, has made organizational changes in the main plant operations: **Arthur M Rogers,** formerly assistant to the vice president in charge of manufacturing sales, and **George A Goss, Jr,** budget director of the manufacturing department, have been made assistants to the vice president and general manager of operations; **Ernest F Rumberg,** assistant planning director, promoted to director, succeeding **John B Goss,** resigned.

R E W Harrison, president of Harrison Engineering Service, Washington, DC, has been appointed to represent the International Research & Development Corp, Columbus, Ohio, before the armed services and government agencies. The company makes portable vibration analyzers and dynamic balancing equipment.

Worthington Corp has set up two new divisions; appointed to staff them: **Aloysius M Tullo,** works manager of the Harrison, NJ plant, named general manager of the Harrison Division; **Clarence K Hood,** Worthington vice president, to division sales manager; **George F Habach,** executive engineer; **Max A Heyman,** works manager; **Thomas F Quinlan,** controller; **Charles Schwalje,** foundry manager. **Vincent Gerbereux,** manager of the Centrifugal Pump Division of the General Sales Department, has been named general manager of the Standard Pumps Division.

You needn't be a gear engineer to use this new Reducer Catalog...

• BRAD FOOTE'S new Speed Reducer Catalog is easy to use. It contains simple instructions on how to choose and how to order. It tells you what job factors to consider and the reasons why. It eliminates the "mysteries" of speed reducer selection.

• Horsepower rating tables* and dimension charts are printed in large easy-to-read type. Pages are uncrowded and easy on the eyes. Every figure and every dimension can be located quickly. Complete index speeds finding the data you need. So do the index markers at the top of each page.

• In the new No. 120 Speed Reducer Catalog, BRAD FOOTE helps you choose the reducer you need from single, double or triple reduction parallel shaft, and double and triple reduction right angle types. It's as easy as A, B, C.

Write today for your free copy

*Conform to AGMA standards

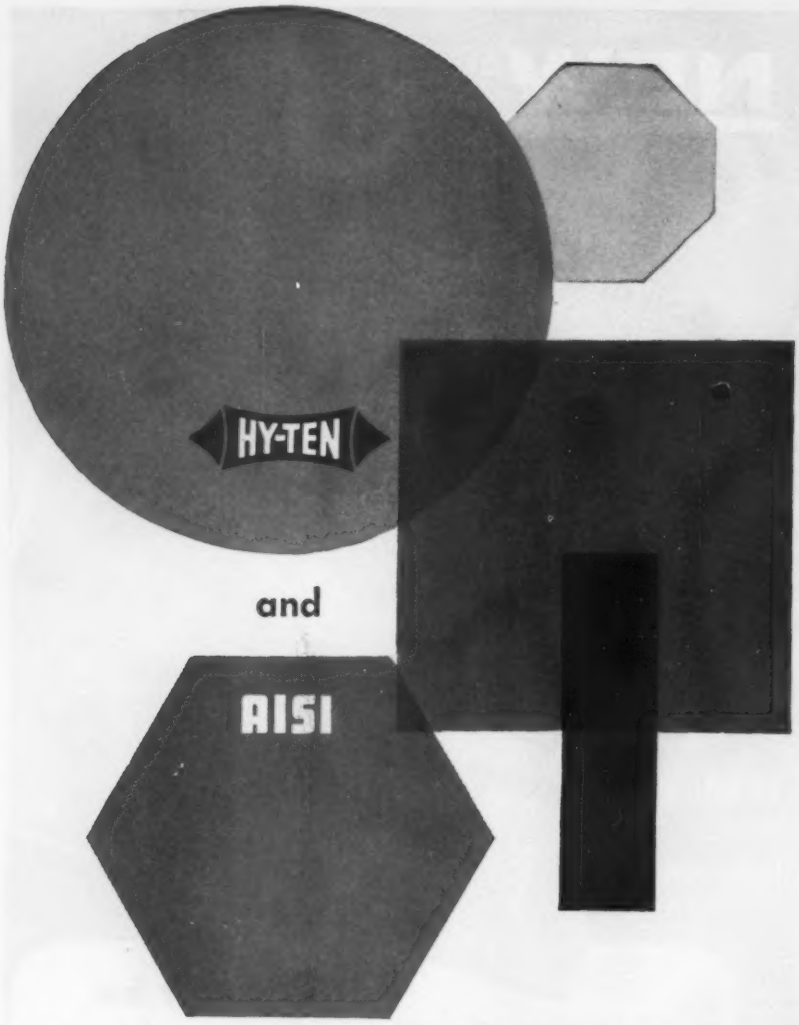
BRAD FOOTE GEAR WORKS, INC.

1309 South Cicero Avenue • Cicero 50, Illinois
Bishop 2-1070 • OLympic 2-7700 • TWX: CIC-2856-U

subsidiaries

AMERICAN GEAR & MFG. CO.
Phone: Lemont 920
Lemont, Illinois

PITTSBURGH GEAR COMPANY
Phone: SPaulding 1-4600
Pittsburgh 25, Pennsylvania



bars, billets and forgings in sizes, shapes and treatments for every need!

Wheelock, Lovejoy & Company, Inc., can fill your alloy steel requirements promptly. This applies to both standard AISI and SAE steels and to our own HY-TEN steels—"the standard steels of tomorrow". Take advantage of our seven strategically located warehouses. All of them can supply these steels in the form and quantity you need. Every warehouse, too, is staffed with expert metallurgists who are ready to serve you.

Write today for your FREE copies of Wheelock, Lovejoy Data Sheets. They contain complete technical information on grades, applications, physical properties, tests, heat treating, etc.

near you . . .

Warehouse Service—Cambridge • Cleveland • Chicago
Hillside, N. J. • Detroit • Buffalo • Cincinnati
In Canada—Sanderson-Newbould, Ltd., Montreal and Toronto

WHEELOCK, LOVEJOY & COMPANY, INC.
137 Sidney Street, Cambridge 39, Mass.

C P Lavelle, formerly plant engineer for the Sikorsky Helicopter Division of United Aircraft Corp, has been appointed division manager of United States Hoffman Machinery Corp's Hygrade Metal Finishing Division

Col Orson A Kinney, USAF (Ret), formerly in charge of all production material problems at Wright Patterson Air Force Base in Dayton, Ohio, has joined Bridgeport Brass Co as director of military products at the company's Aluminum Division, Adrian, Mich.

Paul A Pitt, in charge of development engineering at Solar Aircraft Co, San Diego, Calif, has been appointed chief engineer. **William C Heath,** in charge of the design engineering division, has been named executive engineer, marketing.

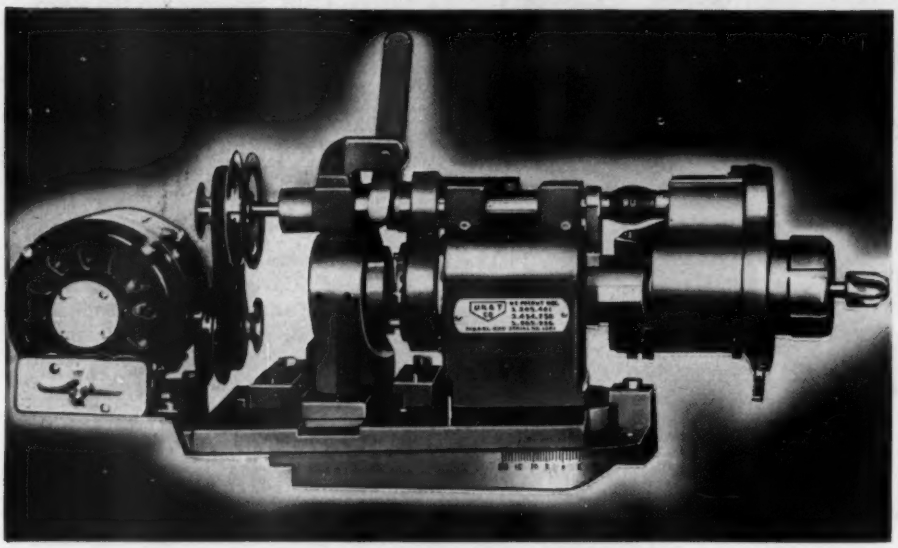
Raybestos-Manhattan, Inc, elective appointments: **S R Zimmerman, Jr,** a director, and assistant general manager of the US Asbestos-Grey-Rock Division, Manheim, Pa, to vice president; **R J Gorecki,** factory manager of the Manhattan Rubber Division, Passaic, NJ, to director; **H H Burrows,** sales manager of the Industrial Rubber Products Division, Passaic, to vice president, rubber sales; **R B Hazard,** sales manager of the Packing Division, to head rubber and packing sales.

John E McClintock, formerly associated with International Business Machines, has been appointed manager of manufacturing of Adams-Rite Manufacturing Co's Aircraft Division, Glendale, Calif.

Larry Kooi, formerly manager of material control for Grand Central Aircraft Co, Glendale, Calif, has been appointed to a similar post at Pastushin Aviation Corp, Los Angeles.

Philip M Klauber, director of public relations for Solar Aircraft Co's San Diego plant, has been named chief administrative engineer.

Precision CIRCULARITY GRINDING ATTACHMENT



Simple, speedy set-ups on this accurate attachment permit fast and easy grinding of form relief, radial relief, form and radial relief together, tapered cylindrical and straight cylindrical. Cutting tool to be produced or reworked is held in collet or between dead centers and revolves on its own axial center. Where full length of spiral cutting tools is to be ground for both form and radial relief, the Circularity Grinding Attachment travel is similar to an O.D. grinder, which insures fine finish, back taper and accurate size.

The Detroit Reamer & Tool Company Model 500 Circularity Grinding Attachment shown above is faster, easier to handle, has positive control, greater adaptability, rugged construction, and is engineered and precision built to provide the finest in precision work. Therefore, it will be of invaluable assistance to anyone whose tooling standards must meet modern production requirements.

You Can Grind Tools Like These on a **DETROIT REAMER CIRCULARITY GRINDING ATTACHMENT**

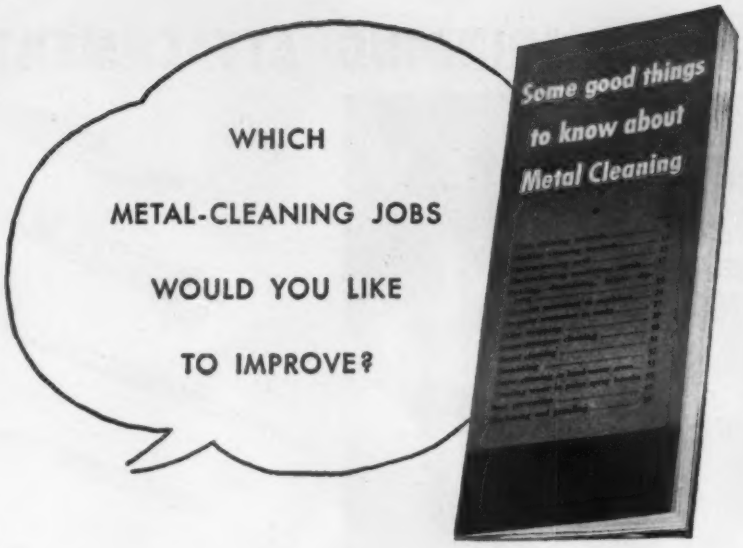
Special Cutting Tools of DEPENDABLE QUALITY

The Detroit Reamer & Tool Co. Plant is equipped with the finest in modern machinery and inspection facilities to provide you with the ultimate in precision tools. Our Engineering and production personnel with 35 years of empirical knowledge behind them are completely qualified to expertly handle your tool needs. For dependable cutting tools—specify Detroit Reamer & Tool Co.

DETROIT REAMER & TOOL CO.

2830 E. SEVEN MILE ROAD • DETROIT 34, MICH.

D R & T COMPANY



Listed below are some of the operations discussed in Oakite's 44-page handsomely illustrated booklet on Metal Cleaning. Please check the list. Then let us show you how Oakite methods can give you better production with greater economy.

Technical Service Representatives in Principal Cities of U. S. and Canada

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

OAKITE PRODUCTS, INC.
24 Rector St., New York 6, N. Y.

Send me a FREE copy of your booklet *"Some good things to know about Metal Cleaning"*. I am particularly interested in improving methods for the following jobs:

- ☐ Tank cleaning
- ☐ Machine cleaning
- ☐ Electrocleaning
- ☐ Pickling, deoxidizing
- ☐ Pre-paint treatment
- ☐ Zinc phosphate coating
- ☐ Paint stripping
- ☐ Steam-detergent cleaning
- ☐ Barrel cleaning
- ☐ Burnishing
- ☐ Rust prevention

*Name*_____

*Company*_____

*Address*_____

Robert R Miller, assistant to the president of Northrop Aircraft, Hawthorne, Calif, has been elected a vice president and executive assistant to the president.

Harold Bender, formerly chief administrative engineer of the Norris-Thermador Corp, Los Angeles, has been appointed production manager of Pastushin Aviation Corp, Los Angeles.

R J Studders, magnet development engineer, Carboloy Department of General Electric Co, has been appointed manager of magnetic products engineering, succeeding **E E George.**

Alfred O Morkish, assistant general manager of American Can Co's closing machine department, has been named general manager.

Robert Lawrence Jenkins, a member of the engineering staff of Chrysler Corp's Dodge Division, has been promoted to quality manager.

Richard Foster, engineering sales manager for Clark Bros Co, Olean, NY, manufacturer of heavy-duty engines, has been named manager of the company's new district office opened in Atlanta, Ga.

B J Osborne, manager of engineering sales for Kaiser Steel Corp, Oakland, Calif, has been appointed assistant to the vice president and general manager, and placed in charge of new Fabricating Division.

Leonard C Schmidt, formerly manager of manufacturing methods at General Electric Co, has been appointed works manager in charge of tooling and production at Worcester Pressed Steel Co, Worcester, Mass.

Willam G Holley, general manager of David Round & Son, Inc, Cleveland hoist manufacturer, has retired after 42 years with the organization.

Robert V Sharkey, purchasing agent for Vickers Inc, Detroit, has been appointed general purchasing agent.

National Malleable & Steel Castings Co promotes: **Roy C Hobson,** from assistant manager to manager of the Chicago plant; **Allan S Bixby,** assistant manager of the Melrose Park, Ill, plant, to manager.

Clayton K Baer, service engineer, has been appointed assistant to the manager of Crucible Steel Co of America's tool steel sales division.

Bernard Schneider has been promoted to chief engineer for Chain Belt Co's conveyor equipment.

TUTHILL PUMP COMPANY EXPERIENCES...

"NO FAILURES

SINCE USING

SAVES MONEY, TOO!"

● Tuthill knows the rotor is the heart of their pump. Quality cannot be compromised. For more than 10 years, Tuthill has used STRESSPROOF for rotors (replacing heat-treated alloy steel) without a failure!

Strength is required in these rotors to transmit the power through the shaft to the idler gear. Extremely high operating speeds mean the rotors must be straight. Wearability is an absolute necessity if the rotors are to stand up under severe operating conditions.

STRESSPROOF has all of these qualities. In addition, it is readily machinable. Its in-the-bar strength eliminates heat treating with its distortion, cleaning and subsequent machining problems. No rough machining, heat treating and finish machining with STRESSPROOF. The rotors are finish-machined from the bar.

STRESSPROOF's minimum warpage eliminates all straightening operations in this case. Its wearability keeps the rotor running year after year. It also provides real savings in both material and manufacturing costs.

STRESSPROOF makes a better part at a lower cost.

Tuthill Model L Series mechanically sealed pumps are used in lubricating, hydraulic, transfer and burning oil service. Capacities range from ⅓ to 6 g.p.m. at pressures up to 600 p.s.i. The rotors for these dependable industrial pumps are made from La Salle STRESSPROOF.

WRITE TODAY FOR

helpful data bulletin No. 15... "Improve Quality—Cut Costs"

AVAILABLE FROM LEADING STEEL DISTRIBUTORS COAST-TO-COAST

La Salle STEEL CO.

1416 150th Street, Hammond, Indiana

MANUFACTURERS OF AMERICA'S MOST COMPLETE LINE OF QUALITY COLD-FINISHED STEEL BARS

The *New* Rockwell-built

The Finest 11" Metal Cutting Lathe *Anywhere Near Its Price...*

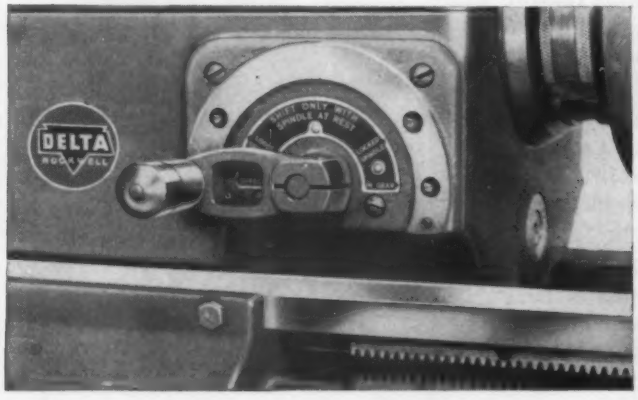
After five years of intensive development . . . after many months of testing under actual production line and tool room conditions . . . the new Delta 11" Metal Cutting Lathe is ready for you to see, to use, *to compare with any other metal lathe of comparable size.*

Into it has gone all of Delta's unsurpassed power tool experience, all of Delta's proven ability to build accuracy, ruggedness, and versatility into metal working machines. When you see it, you'll see why it's the finest 11" metal cutting lathe on the market today . . .

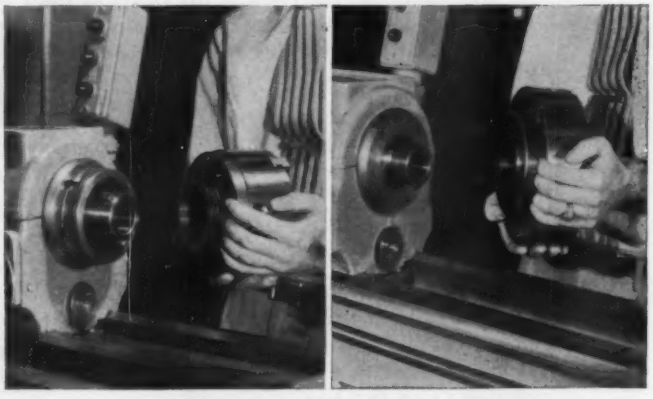
...With Quality Features Found In No Other Lathe *At Any Price!*

No other 11" metal cutting lathe, *regardless of price,* combines all of the precision, safety, and convenience features—all of the built-in Delta Quality "extras"—that you'll find in this great new lathe.

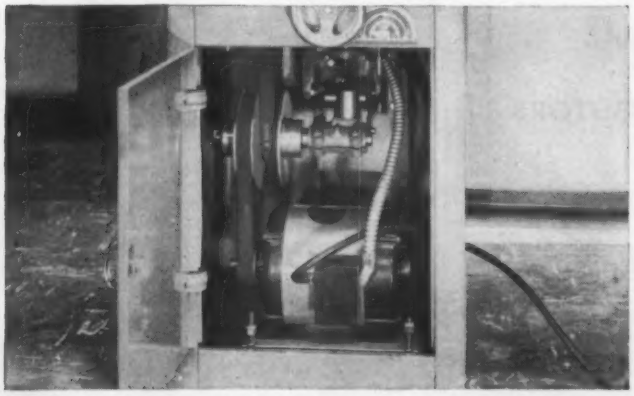
Only Delta gives you features like these:



EXCLUSIVE BACK GEAR SHIFT LEVER. Eliminates need for using wrenches, pulling out pins, or opening guards to shift from direct spindle drive to back gear spindle drive, loose or locked spindle.



CHOICE OF SPINDLE NOSES. Only Delta gives you choice of safe L-00 Tapered Key Drive or conventional 2¼"-8 Threaded Spindle Nose *at no extra cost.*



PERFECTED VARIABLE-SPEED DRIVE offers a speed range of 45 to 1550 rpm with an infinite choice in that range . . . *Plus* the high torque transmitting power of matched V-Belts. *No other lathe gives you this combination of power and convenience!*

SEEING IS BELIEVING...

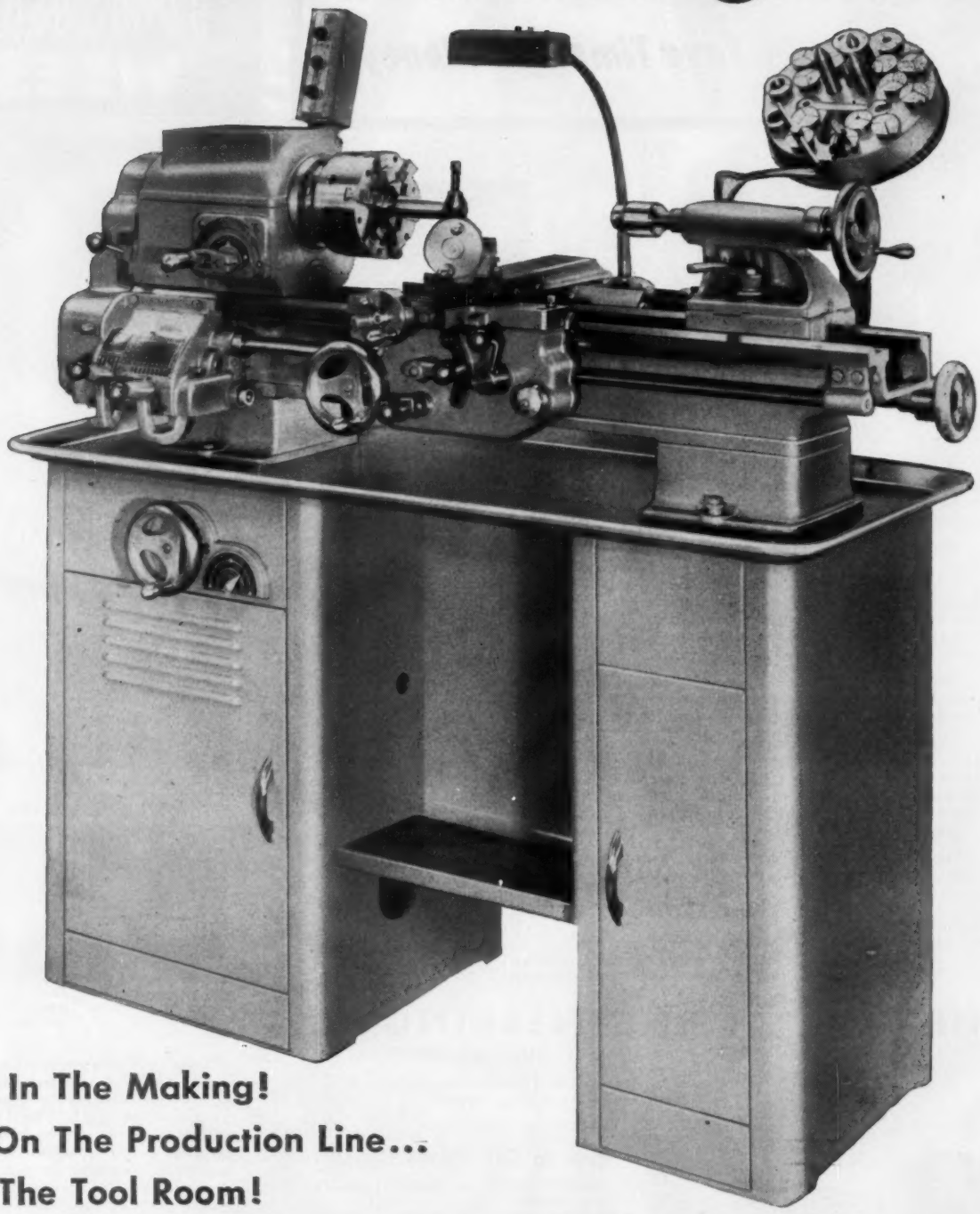
There are many, many more outstanding new features, too many to list here. You've got to *see* this great new Delta Metal Cutting Lathe to really appreciate it. *Send the coupon for the name of the Delta Dealer nearest you who has this new lathe development on display and available for immediate delivery.*

DELTA ROCKWELL **DELTA** QUALITY POWER TOOLS

Another Product by **Rockwell**

DELTA QUALITY COSTS NO MORE

DELTA Metal Cutting Lathe



5 Years In The Making!
Tested On The Production Line...
And In The Tool Room!

DELTA 11" METAL CUTTING LATHE. Cabinet model. Variable speed drive with 24" capacity center to center, and 1" collet capacity. Diameter of hole through spindle, 1⅜". Choice of 2¼"-8 threaded spindle nose or L-OO Tapered Key Drive spindle nose, at no extra cost. Full line of accessories available, including new telescopic taper attachment with magnifying lens and micrometer adjustment; also micrometer carriage stop, milling attachment, and a complete line of standard accessories now available. Send coupon for complete information.

Send This Coupon For Free Catalog!

Delta Power Tool Division, Rockwell Manufacturing Company
618C N. Lexington Ave., Pittsburgh 8, Pa.

☐ Please send name of my nearest Delta Dealer who has the new Delta 11" Metal Cutting Lathe under power.

☐ Please send me catalog information on new Delta 11" Metal Cutting Lathe.

Name_____ Title_____

Company_____

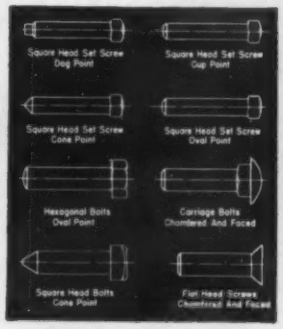
Address_____

City_____ County_____ State_____

ECONOMY Automatic Pointing Machines

Save Time and Money!

TYPE 3300


Square Head Set Screw Dog Point
Square Head Set Screw Cup Point
Square Head Set Screw Cone Point
Square Head Set Screw Oval Point
Hexagonal Bolts Oval Point
Carriage Bolts Chamfered And Faced
Square Head Bolts Cone Point
Flat Head Screws Chamfered And Faced

Typical parts machined on the TYPE 3300

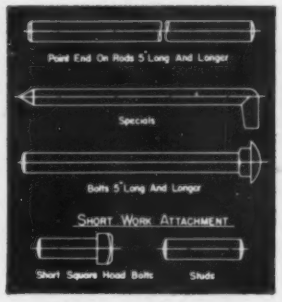
ECONOMY Automatic Pointing Machines are hopper fed and automatic in operation. These features enable operator to run several machines resulting in greater productivity and lower costs.

These Automatic Pointers are available in two sizes—Type 3300 for uniformly pointing bolts and screws to 3/8" diameter and 3/4" to 3-1/2" in length, the type 4600 for pointing bolts and cap screws 1/4" to 3/4" diameter and 1" to 6" in length. A single machine will handle all types of points on many types of bolts and cap screws.

Production rates of the type 3300 vary infinitely from 2,000 to 6,000 finished parts per hour and on the type 4600 from 1800 to 5400 per hour.

Also available is the type "P" Semi-Automatic Pointing Machine for pointing bolts, cap screws, studs and rods 1/4" to 1-1/2" diameter, 5" or more in length. Production rates up to 2,000 pieces per hour make it a valuable secondary machine for short runs.

Consult ECONOMY on low cost, high production Bolt and Screw Pointing operations.



Typical operations performed on TYPE "P" Semi-Automatic Pointing Machines

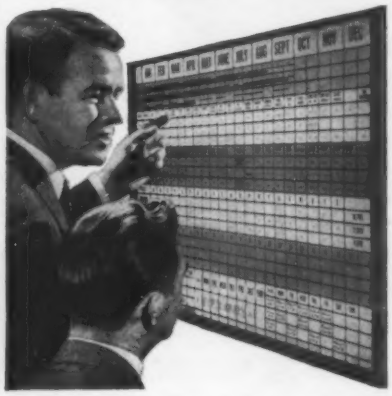
THE ECONOMY LINE

Automatic Shaving Machines
Automatic Pointing & Shaving Machines
Automatic Pointing & Threading Machines
Double End Automatic Pointing Machines
Automatic Pointing Machines
Semi-automatic Pointing Machines

THE ECONOMY ENGINEERING CO.

WILLOUGHBY, OHIO

Designers and Manufacturers of Secondary Operation Machines since 1915



How to Get Things Done!

- ★ BOARDMASTER Visual Control Saves You Time, Money.
- ★ Gives Graphic Picture of Your Operations at a Glance.
- ★ Simple to Operate. Type or write on Cards, Snap in Grooves.
- ★ Ideal for Production, Traffic, Sales, Inventory, Scheduling, Etc.
- ★ Made of Metal. Compact and Attractive. Over 50,000 in Use.

Full price **$49.50** with cards

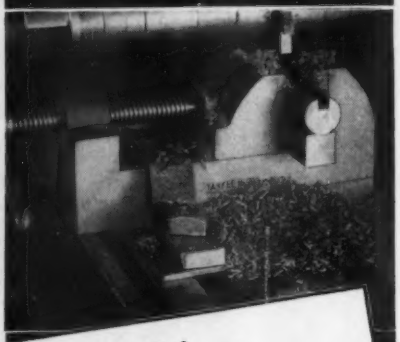
FREE 24-page illustrated BOOKLET No. K-200 Without Obligation

Write Today for Your Copy

GRAPHIC SYSTEMS

55 West 42nd St. • New York 36, N.Y.

"YANKEE" VISES



Give *Start-to-finish* work holding

Off the swivel base, end down for accurate marking.

Back on the swivel base, at the bench, for center punching.

Lifted onto drill press, still accurately in position.

Held in same position but moved to milling machine.

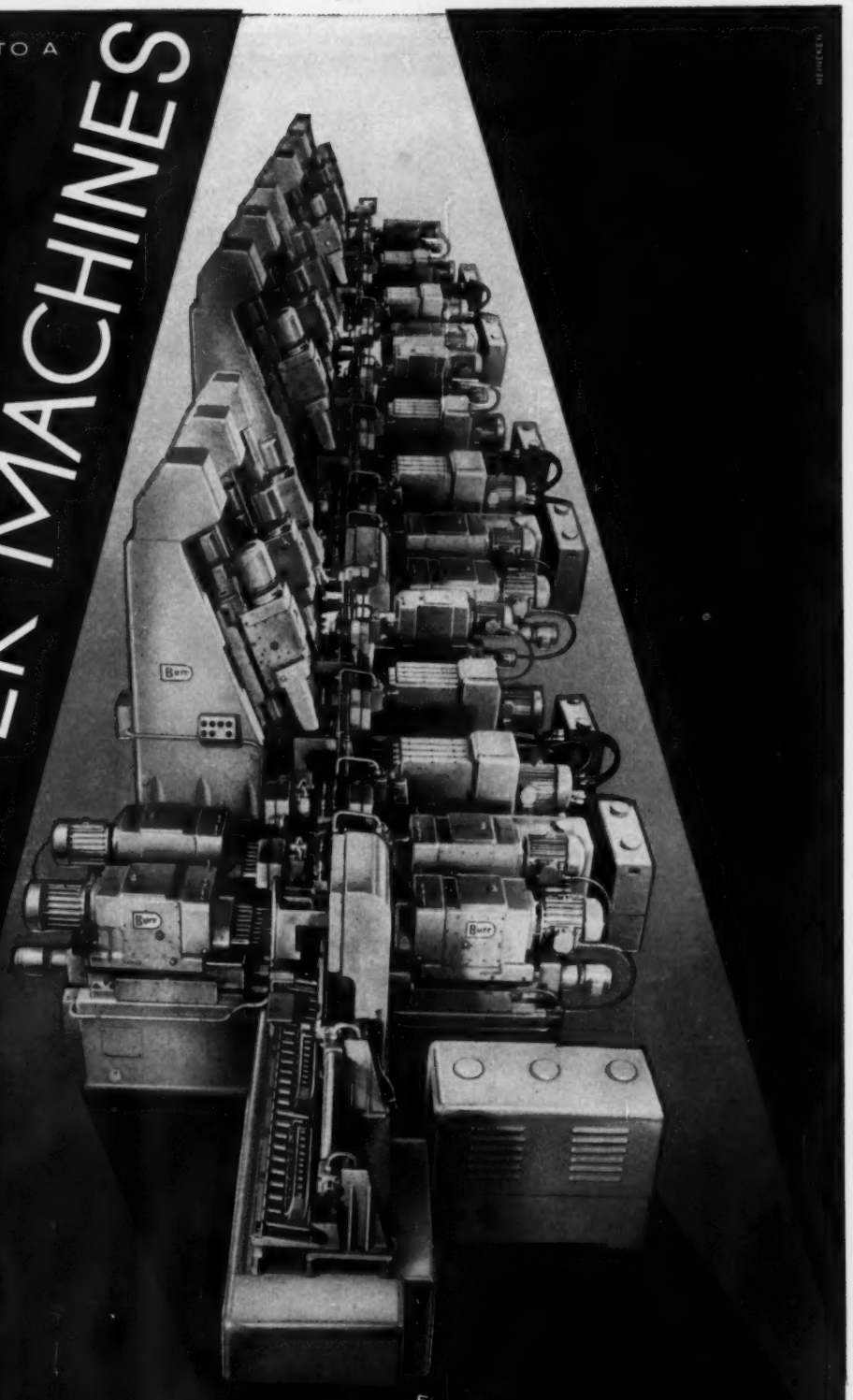
Take a job through every step without a misstep . . . faster, easier . . . in a "Yankee" Vise. Work lined up accurately from bench to drill press, to milling machine and back to bench. Lifts off and on a swivel base at the bench. Vise squared on top, bottom, sides and front end for machine work. Easily made into handy, economical jig. Hardened steel block, V-grooved, provided with each "Yankee" Vise. Four sizes, with and without swivel base . . . 1½", 2", 2¾", and 4" jaw widths. Your industrial distributor carries the full line. **"Yankee" Tool Book FREE!**

NORTH BROS. MFG. CO.
203 West Lehigh Ave.
Philadelphia 33, Pa.

"YANKEE" TOOLS NOW PART OF
STANLEY
THE TOOL BOX OF THE WORLD

CUTS COSTS DOWN TO A MINIMUM

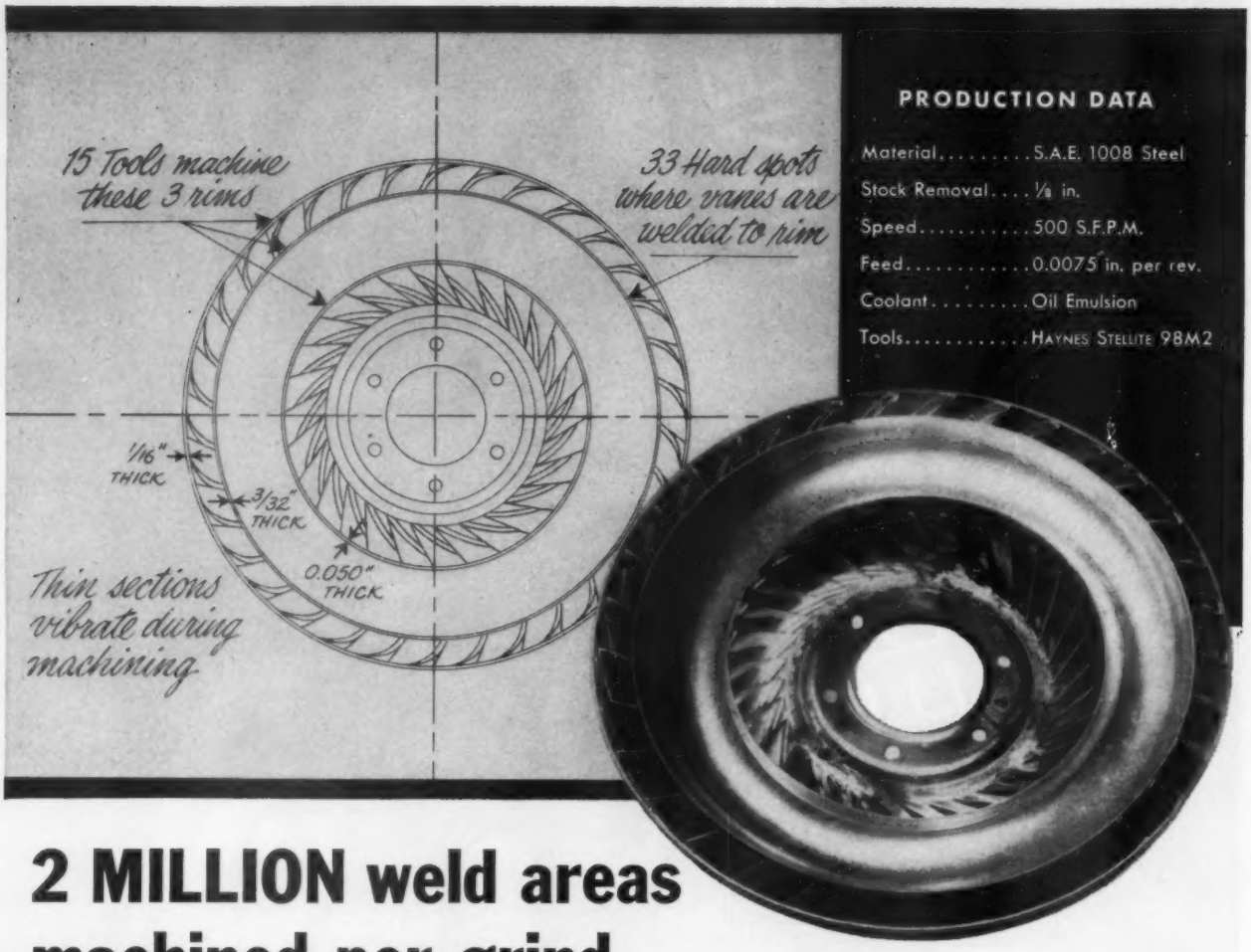
TRANSFER MACHINES



Eight-station transfer line for cylinder heads, for roughing, semi-finishing and superfine boring valve openings, and boring, spotfacing and tapping sparking plug holes.
Cycle time — time per component 2.2 min.

Burr

LUDWIGSBURGER MASCHINENBAU GMBH • LUDWIGSBURG / WÜRTT. GERMANY



2 MILLION weld areas machined per grind

HAYNES STELLITE 98M2 tools machine 1,000 of these torque converter turbine wheels between grinds. Fifteen tools are used to machine the three rims. There are 33 weld areas on one of the rims where the vanes are joined to it. On every revolution a HAYNES STELLITE tool cuts through these hard spots. It makes 2,100 interrupted cuts per wheel . . . over two million per grind. In addition, all 15 tools must withstand the shock set up by vibrations of the thin sections.

The parts are double indexed on an automatic lathe at six stations. Spindle speed is about 160 revolutions per minute. Feed rate is 0.0075 in. per revolution. Machining speed is 500 surface feet per minute. Total machining time per turbine is 28 seconds, and approximately 125 wheels are finished in an hour. The HAYNES STELLITE tools operate for a full eight-hour shift without chipping or spalling.

HAYNES STELLITE tools have an unusual combination of red hardness and toughness. They remove metal fast because they can take deep cuts at heavy feeds. For full details write for the booklet, "HAYNES STELLITE Metal-Cutting Tools."

HAYNES TRADE-MARK ALLOYS

HAYNES STELLITE COMPANY

A Division of Union Carbide and Carbon Corporation

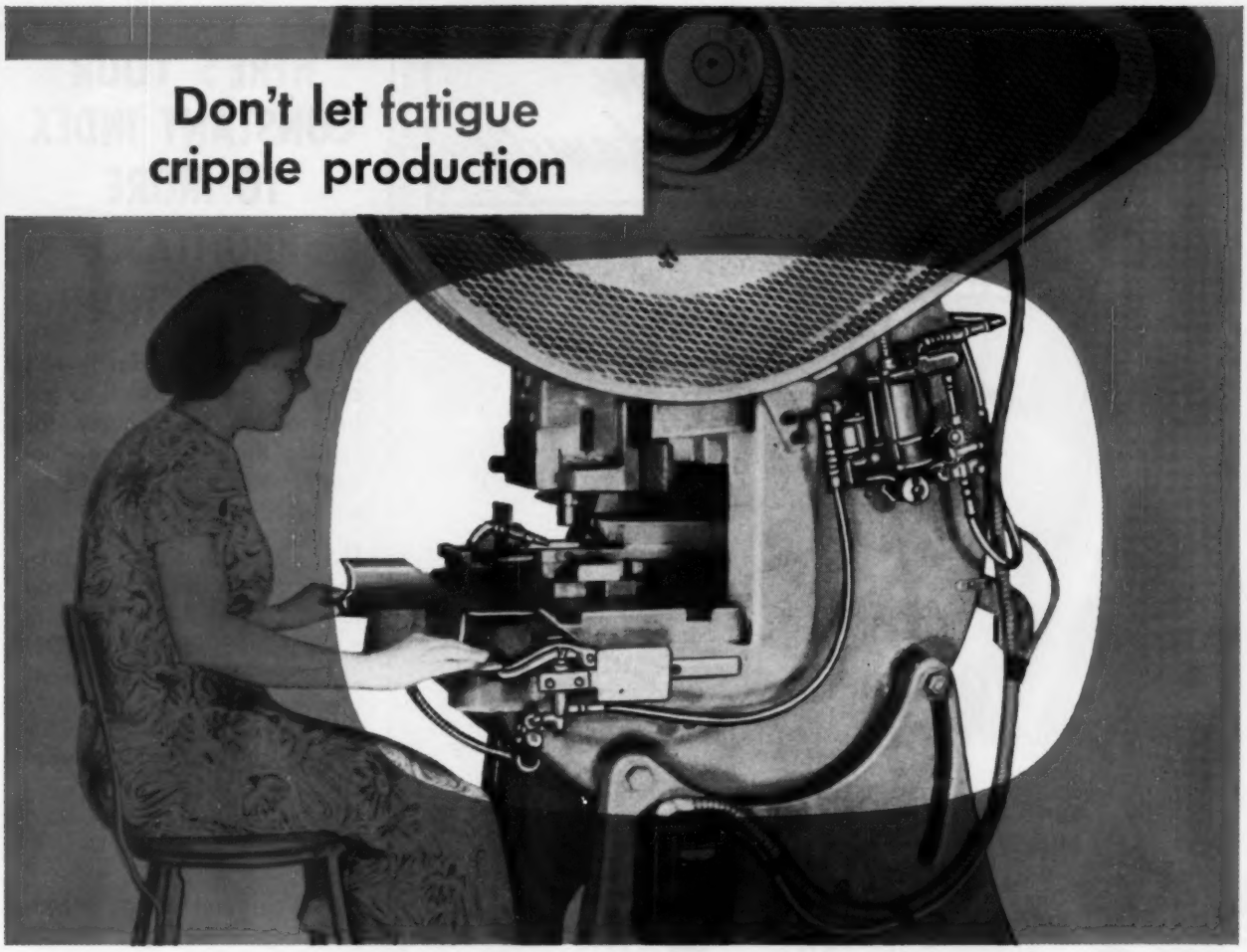
UCC

General Offices and Works, Kokomo, Indiana

Sales Offices

Chicago • Cleveland • Detroit • Houston • Los Angeles • New York • San Francisco • Tulsa

"Haynes," and "Haynes Stellite" are registered trade-marks of Union Carbide and Carbon Corporation.



Don't let fatigue cripple production

...use Schrader Pneumatic Controls

INCREASE PRODUCTION, ELIMINATE FATIGUE . . . *WITH GREATER SAFETY*

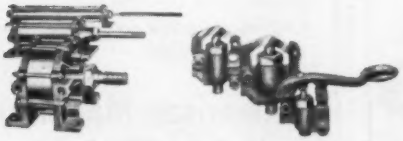
Schrader Air Controls give not only greater production with less fatigue . . . but they provide greater safety all along the production line.

There is a Schrader Pneumatic Control to cover most any machine operation . . . power presses, press brakes, and any machine using either a friction or mechanical clutch. Schrader Controls promote building a high-speed work rhythm that pays big production dividends with safety. A special arrangement of valves prevents operators from tying down either of the two hand controls to defeat the purpose. Both hands must operate the valves at the same time or the press will not function.

Want more information on these and other new and improved Schrader Pneumatic Controls? Write today . . . or fill out coupon below!

Schrader
REG. U. S. PAT. OFF.

LEADERS IN AIR CONTROL SINCE 1844



The complete Schrader line of pneumatic accessories includes everything you need

A. SCHRADER'S SON
Division of Scovill Manufacturing Company, Incorporated
460 Vanderbilt Avenue, Brooklyn 38, N. Y., Dept. A-3

I am interested in more information on_____

Name_____ Title_____

Company_____

Address_____

A new addition to the LENOX family

ARBOR SCREWS INTO BODY OF SAW, SECURED BY TWO DRIVE PINS

TOUGH ALLOY STEEL BACK

ELECTRIC WELDED HIGH SPEED STEEL EDGE

SHATTERPROOF

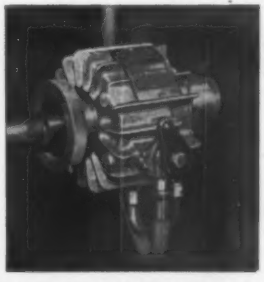
SEND FOR LENOX HOLE SAW BULLETINS AND LITERATURE TODAY!

IMMEDIATE DELIVERY OF LENOX HOLE SAWS FROM OUR LARGE STOCK

LENOX HOLE SAWS

LENOX — AMERICAN SAW & MFG. COMPANY, SPRINGFIELD, MASSACHUSETTS

BAND SAW BLADES • HACK SAW BLADES • GROUND FLAT STOCK • HOLE SAWS



STEP UP PRODUCTION 20% +

... for most lathes to 1" bar stock capacity

- Hold delicate parts without damage or adjustment
- Iron grip for heavy work
- No adjusting for stock or part variations
- Finger-tip or foot control eliminates operator fatigue
- Eliminates jarring of head stock

(Ten day FREE TRIAL to reliable firms)

WILSON AIR COLLET CLOSER, INC.
909 40th Ave. NE, Minneapolis 21, Minn.

AS GOOD AS GOLD

When you're looking for an idea and the answer is at your fingertips, your source material is "as good as gold." Thousands of production - conscious metalworking men throughout the nation share this experience and opinion when they refer to their 1955 PRODUCTION PLANBOOK issue of *American Machinist*.

To find the idea you need, investigate today the more than 2,000 production "nuggets" in your copy of our 1955 PRODUCTION PLANBOOK.

American Machinist
McGraw-Hill Building
New York 36, N. Y.

HERE'S YOUR CONSTANT INDEX TO MORE PROFITABLE PRODUCTION

This is just a reminder there's an easy way in which to get information in a hurry for solving those knotty production problems you're faced with daily.

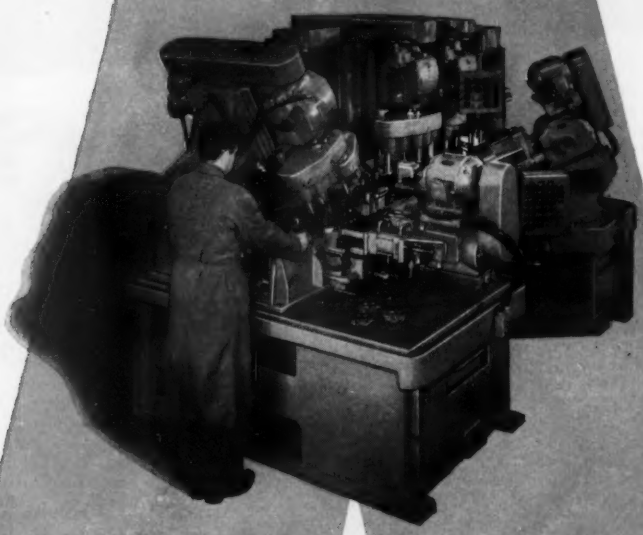
Listed below is a general subject index to the answers you need, as you'll find them in your 1955 PRODUCTION PLANBOOK issue of *American Machinist*.

- **A** Management, Personnel
- **B** Machining
- **C** Tooling
- **D** Pressworking, Molding, Casting
- **E** Inspection, Testing, Quality Control
- **F** Assembly, Welding, Portable Tools
- **G** Heat-Treat, Cleaning, Finishing
- **H** Materials, Components
- **I** Materials Handling, Services
- **J** Prize Ideas, Rebuilt Equipment

And that's not all. An integral part of these ten sections are hundreds of informative advertisements . . . a list of manufacturers offering free product literature . . . and an alphabetic listing of products and services advertised in the PLANBOOK.

Information like this can help you find sure roads to faster, lower-cost production.

American Machinist
McGraw-Hill Building
New York 36, N. Y.



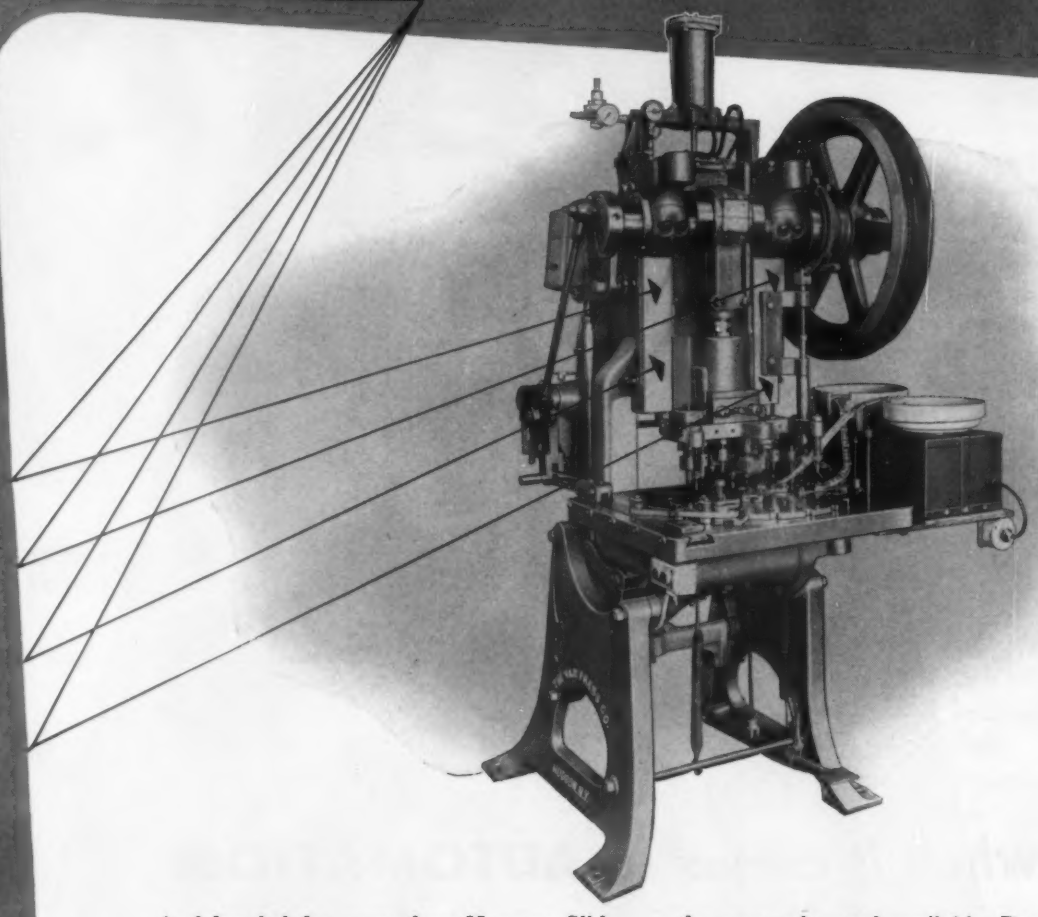
when it comes to AUTOMATION

This eight station multiple spindle dual loading Transfer Type Machine uses an air-hydraulic transfer mechanism. Various drilling and tapping operations are performed on cast iron carburetor throttle bodies at the rate of 450 per hour at 100% efficiency. Parts are located and clamped automatically in previously machined butterfly valve holes at each station. Parts ride free on rails between work stations. New brochure shows why, when it comes to automation . . . it pays to come to . . .

HARTFORD *Special*

THE HARTFORD SPECIAL MACHINERY CO. • HARTFORD 12, CONN.

Precision presswork (AND COST REDUCTION) starts here where V & O leads



And has led for more than 65 years. Slide lengths in V & O's are two to three times longer than usual in O.B.I. presses. But that's only part of the story. To assure the full benefits of long slide precision, V & O builds the rest of the press to the highest machine tool standards. Slides and bearings are hand-scraped. The pneumatic clutch is the most advanced available. Rugged construction assures the extra-rigidity so essential to precision presswork.

For presses equipped and automated to perform specific jobs, consult V & O. For presses that are easiest for your own toolmakers to automate or equip, make sure they're V & O's.

Only the best is good enough

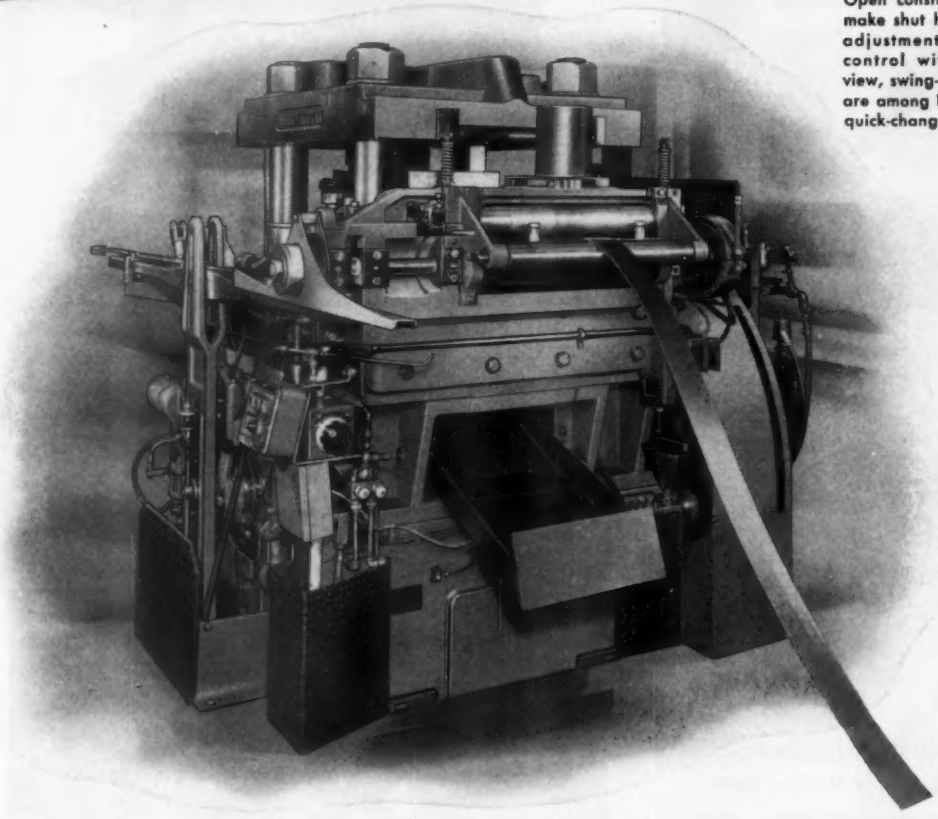
THE V&O PRESS COMPANY DIVISION
HUDSON, NEW YORK

Our representative will be glad to give you the complete story about V & O presses and engineering services. For more information please write for our catalog.

EMHART

Two to three die changes a day

HENRY & WRIGHTS COMBINE HIGH SPEED OPERATION WITH HIGH SPEED JOB CHANGE



Open construction, easy-to-make shut height and feed adjustments plus inching control with die in full view, swing-away roll feeds are among Henry & Wright quick-change features.

As many as two to three job changes in a day are being made by companies taking advantage of the quick-change features of Henry & Wrights. These companies report sharply reduced costs on short runs. A contract plant said it had greatly improved its competitive cost situation and was re-bidding on jobs previously lost.

Their unique quick-change features are just some of the reasons why Henry & Wrights rate preference in modernization programs. Other advantages are high speed with minimum vibration, precise alignment of punch and die, quick-stop pneumatic clutch, overall rigidity—and the assurance of longer die life.

H&W **Only the best is good enough**

You owe it to yourself to get the complete story about Henry & Wrights and how they can improve your stamping methods. Our representative will be glad to give you the details.

HENRY & WRIGHT DIVISION
760 WINDSOR STREET, HARTFORD, CONNECTICUT

MFG. CO.

production begins with

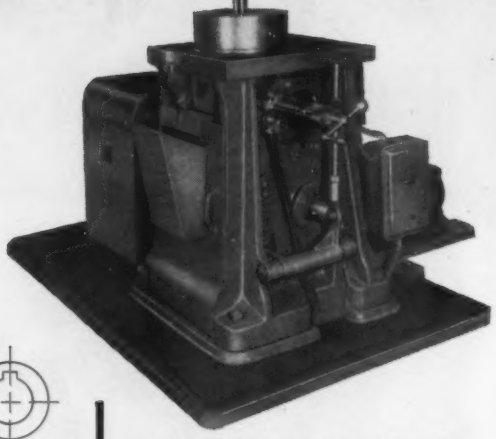
Columbus Die-Tool

Get production off to a profitable start! Use Columbus Die-Tool engineered tools. Jigs, Fixtures, and Special Machinery individually designed and built to produce your product alone . . . at a rate to match your production schedule. That's production economy! That's the wisdom of CDT special machinery! That's how Columbus Die-Tool can put your production on a profitable basis. Columbus Die-Tool are specialists in building special tools, jigs, fixtures and machinery . . . have been for over 46 years. Talk over your special problems with us. Absolutely no obligation. Write today.

Columbus Die-Tool
AND MACHINE COMPANY
P. O. BOX 750 • COLUMBUS, OHIO
ESTABLISHED 1906

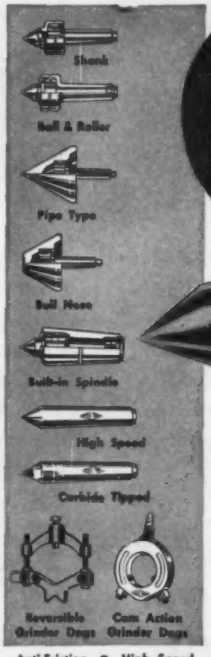
Manufacturers of
JIGS • FIXTURES • BUILDING MACHINE TOOLS COMPLETE
SPECIAL TOOLS • UNITS FOR MACHINE TOOLS

M&M giant keyseaters



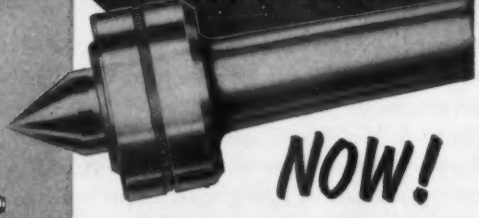
M & M Giant Keyseaters cut internal keyways or splines in the bores of pulleys, gears, flywheels and other machine parts. Fast, accurate operation. Built in a wide range of sizes. Special fixtures and cutters available for unusual shapes and taper work. Write today for complete information.

MITTS & MERRILL
104 Holden Street • SAGINAW, MICHIGAN
83



Anti-Friction • High Speed • Carbide Tipped—200 Models, speeds up to 4000 RPM, capacities to 200 tons.

RED E CENTERS
WORLD'S MOST ACCURATE PRECISION CENTERS



NOW!

DISTRIBUTOR STOCKED

At long last — RED-E CENTERS, with the *ACCURACY GUARANTEE* are made available to you through your distributor. Now you have a choice of sizes, types, shanks, tapers, heads and bearing assemblies for your every *turning* and *grinding* operation.

Satisfy your special need — conveniently, completely; obtain super finish, ultra precision unmatched accuracy — at no extra cost!

REPLACE WITH RED E and be Sure

YOUR DISTRIBUTOR IS READY TO SERVE YOU!
Call on him today! Literature available, of course, no obligation.
VISIT RED-E—ASTE, L.A. BOOTH 1025
DISTRIBUTOR INQUIRIES INVITED!
CENTER *Specialists Since* 1908
READY TOOL COMPANY
548 Ironiston Ave. • Bridgeport 5, Conn.

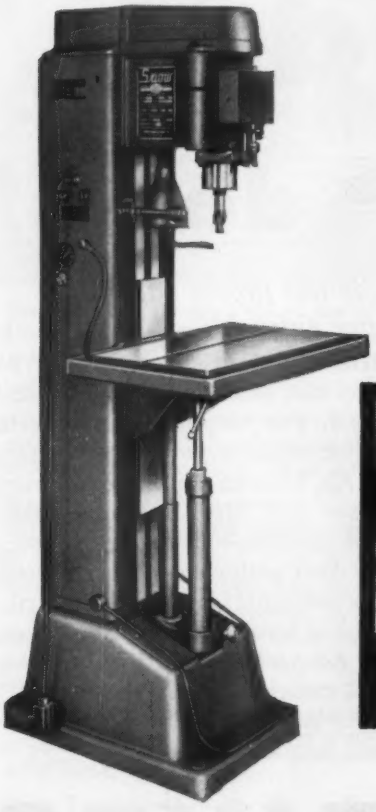
Quicker changeover, lower tooling costs...

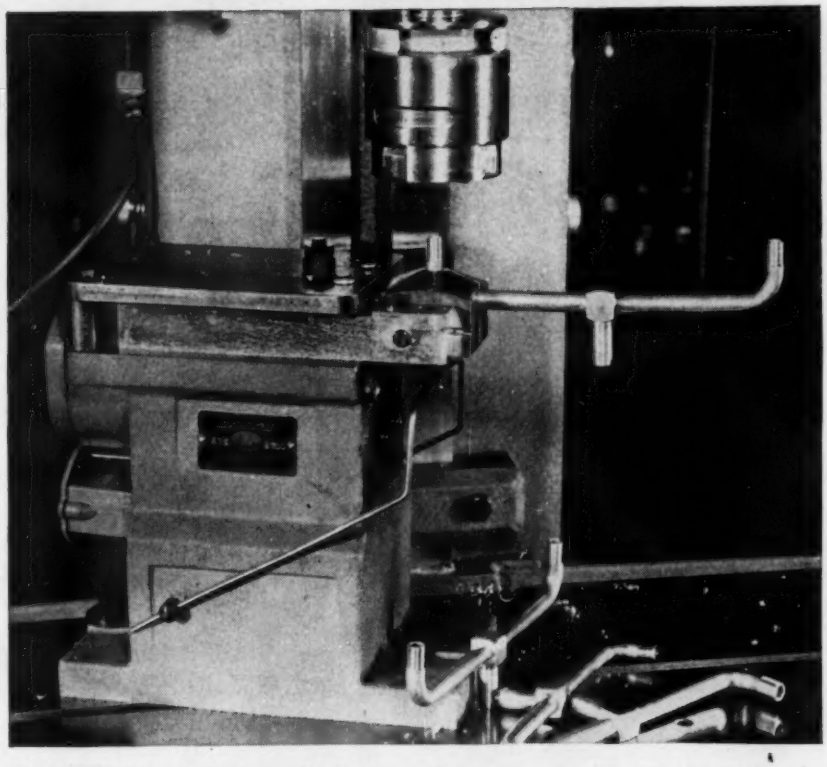
with SNOW FULL UNIVERSAL MACHINES

ELECTRICALLY OPERATED AIR CONTROLLED AUTOMATIC OR SEMI-AUTOMATIC

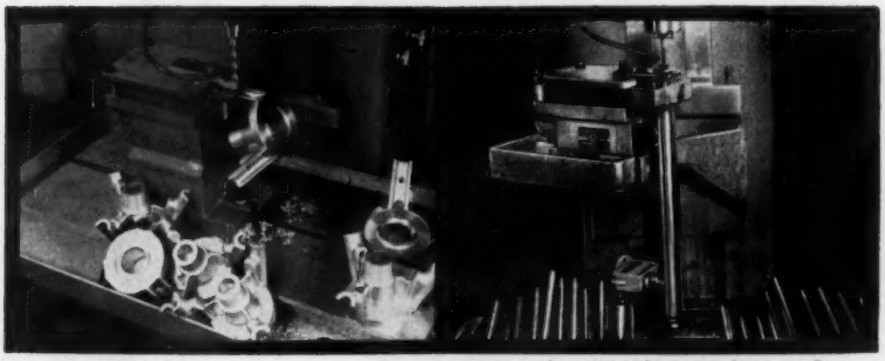
Basic Master Fixtures for DRILLING, THREADING or TAPPING. Snow universal machines are the most flexible, most efficient, and most economical known. They save countless dollars in changeover time — help you start jobs sooner — assure quality at high production rates.

The square footage under a Snow Machine in your factory can be the most profitable in your whole plant. Submit details of your requirements.





AIR VISE holds part firmly — self-centering — always in exact position for precision work. U-shaped wire underneath provides quick finger-tip control, automatically starting spindle cycle. Jaw inserts keep tooling costs at minimum. Blank jaws always in stock — can be tooled to fit your part promptly, inexpensively.



Irregularly shaped parts are easily handled. Front feed permits close setting of guide plate for greater accuracy with high production.

Here a short AIR VISE mounted on an offset table holds long tubing. Piece-part switch under table automatically closes vise and starts tapping operation.

SNOW MANUFACTURING CO., BELLWOOD, ILL.
(Suburb of Chicago)

Under heavy load Gates Vulco Ropes—the V-belts with concave sides—grip pulley grooves more firmly and pull harder.

This large lathe was formerly driven by a flat belt which slipped on heavy cuts, stalled and broke tool bits. Savings on broken tool bits alone offset the cost of the drive the first year ...and production was increased 25%.

Concave sides keep belt costs down!

Industry is saving thousands and thousands of dollars every year by specifying Gates Vulco Ropes—the V-Belts with *concave sides* (U.S. Pat. No. 1813698).

Here's the interesting reason *why* Gates belts save money:

On the bend around the sheave the *precisely engineered* concave sides (Fig. 1) of the Gates belt fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley. That means sure pulling power and *even distribution of wear*. Longer wear, fewer replacements cut belt costs...reduce down time...contribute to profits.

Simple test proves value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. The bulging sides prevent the belt from fitting evenly in the pulley groove (Fig. 2-A). Uneven contact causes uneven wear...shortens belt life...increases costs.

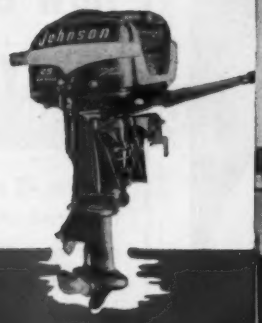
Keep belt costs *down* by specifying Gates Vulco Rope Drives—the V-Belt with *concave sides*. Belts you need are readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

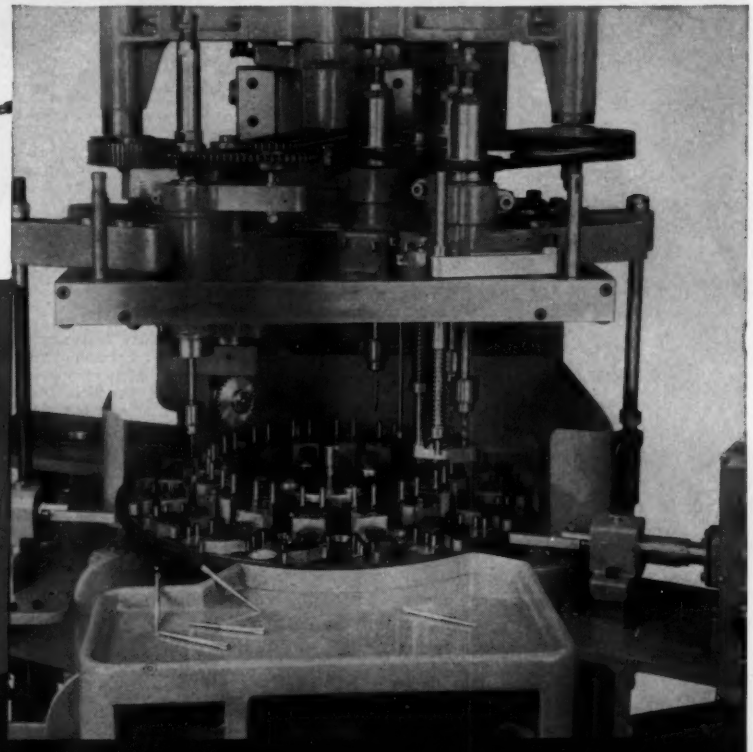
TPA 25-A

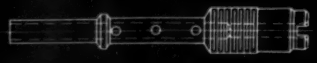
GATES VULCO ROPE DRIVES

Bodine CASE HISTORY NO. 39



PROCESSING 3 PARTS
22 VARIATIONS
FOR
JOHNSON "SEA-HORSE"
OUTBOARD MOTOR





1. NEEDLE VALVE:

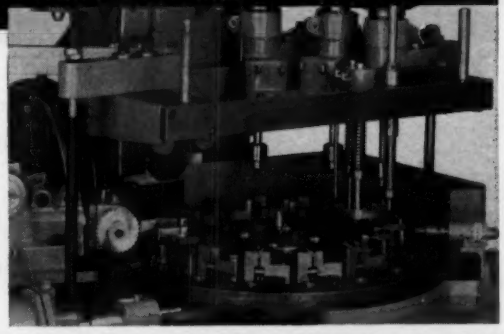
Drill hole 1⅛" deep in top end. Countersink hole to ⅜" dia. 25° included angle. Mill .035" slot 1⅛" deep down center axis of hole, vertical milling spindle. Tap hole 6-32 NG-2 to ⅞" deep. Production 750 pieces per hour . . . in 11 lengths . . . 2½" to 4½".

2. HIGH SPEED NOZZLE:

(Vertical milling spindle removed; horizontal spindle substituted.) Seven different nozzles, 1 to 3 holes of different diameters produced. Meter holes drilled through one side and a hole 1⅜" deep in small end of nozzle. Mill 1/16" slot, 1/16" deep in top end of nozzle with horizontal milling spindle. Production, 1500 pieces per hour.

3. FLOAT VALVE SEAT:

Processed with 4 variations in the inside dia. of seat. Two I.D. diameters combination reamed to .004" (T.I.R.) concentricity with clamping dia. Valve seat rough and finish faced, depth tolerance .005". Mill 3/64" slot, ⅛" deep (horizontal spindle). Production, 1100 pieces per hour.



The three jobs detailed above are produced on the Bodine standard Model No. 41-20 . . . by means of a changeover of two horizontal indexing dials and sets of spacers for the variety of lengths of the needle valves.

All parts are hand fed, automatically positioned and clamped. The needle valves are automatically unclamped and unloaded by hand to protect the needle points. Other products are automatically ejected.

The installation of the vertical (photo above) and horizontal (photo at right) milling spindles with the other tools saved an extra handling on all three jobs.

All operations are held to close tolerances. Bodine offers 4 standard-size models which will perform Drilling, Tapping, Milling and Screw Inserting. Operations may be combined as required . . . or machines may be tooled for assembly only, with hopper feed and transfer mechanism for completely automatic production.

Bodine automatics will give you tomorrow's production today. Send us your tough problems . . . we may solve them to your competitive advantage.

Write Dept. AM-3 for the Bodine Case History Brochure.

"You Can't Meet Tomorrow's Competition with Yesterday's Machine Tools"

28D85

THE
Bodine
CORPORATION
BRIDGEPORT CONNECTICUT

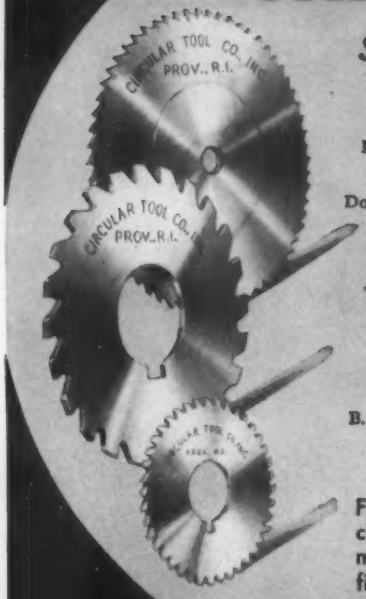
AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

On metal-cutting problems

consult these

CIRCLE R

specialists



BURBANK
Production Machinery Sales, Inc.

CHICAGO
Donald Robertson & Co.

CLEVELAND
Production Tool Co.

DAYTON
J. R. Kuntz Company

DETROIT
A. D. Spruce

INDIANAPOLIS
Walter F. Greene & Associates

KANSAS CITY
B. C. MacDonald & Co.

MILWAUKEE
Ford Tool Co.

NEW YORK CITY
F. A. Brady, Inc.

NEW YORK CITY
J. V. Cremonin (Export)

PHILADELPHIA
General Tool Sales Co.

PHOENIX
DiEugenio Tool Center

PITTSBURGH
Ralph Esposito & Company

PROVIDENCE
Fred J. McMillen

ROCHESTER
James O. Horne

ST. LOUIS
B. C. MacDonald & Co.

MONTREAL
Humphrey B. Walton

For all production, including complex automation, we make the finest circular metal-cutting tools—but they cost no more.

SUPREME QUALITY R 1923 - 1955

CIRCULAR TOOL CO., INC.

PROVIDENCE 5, RHODE ISLAND

Specialists in Circular Cutting Tools Since 1923

METAL SLITTING SAWS
COPPER SLITTING SAWS
SCREW SLOTTING SAWS
COMMUTATOR SLOTTING SAWS
JEWELERS SLOTTING SAWS
CUT OFF SAWS • CIRCULAR KNIVES & ROTARY SHEAR BLADES • CIRCOLOY STEEL SAWS • SOLID & TIPPED TUNGSTEN CARBIDE SAWS
COMBINED DRILLS & COUNTERSINKS • CENTER REAMERS

From the *American Machinist* Library of *Tips for Top Shop Men*

AN invisible boss presides over every collective bargaining session. He is not labor, management, or government—but is the customer, who exercises power of selection over your company's products.

How efficient is YOUR shop?

Over 42 per cent of metalworking production equipment is now over ten years of age . . . 19 per cent of it was bought more than 20 years ago!

This means that there is more over-age and obsolete production equipment operating in metalworking shops now than in 1945, and the rate of obsolescence is growing.

How about your shop? Are you equipped adequately with the modern, high-efficiency machinery and equipment which alone can produce the better products that cost *less to buy* which everybody wants? How does your shop compare with those of your competitors, and with metalworking shops generally?

You can find out quickly by writing for a copy of the *American Machinist* Mid-Century Inventory of Metalworking Production Equipment. Here are all the facts on the age and number of 155 major types of production equipment, operating in 15 manufacturing divisions and 25 major production areas. Price: $2.00 per copy.

American Machinist

Reader Service Department

McGRAW-HILL BUILDING
NEW YORK 36

. . . IF IT'S A HIGH PRODUCTION PROBLEM . . .

ASK BAIRD ABOUT IT

It's

"GOOD FORM"

TO MAKE YOUR **RIBBON METAL** PARTS ON THE **BAIRD** AUTOMATIC

After completion of the tooling setup and adjustment of the several mechanisms, you merely start the machine for fully automatic production.

Baird standard automatic Four-Slide Ribbon Metal Forming Machines are capable of producing thousands of shapes and sizes of products and components. In addition, various accessories, attachments, and special cams extend production possibilities to an uncountable quantity. The machine may be arranged to handle round wire if required.

Speed is the low-cost factor; smooth, reliable operation is another; also, easy access to tooling and inspection of work.

The story in detail is too long to present in this space, so you will want full particulars. This is the one machine you need to give you unusually fast and accurate production. "Ask Baird about it." Write Dept. AM.

THE BAIRD MACHINE COMPANY

STRATFORD CONNECTICUT

WHERE YOU WILL GET THE HELP OF SPECIALISTS ON THESE ESSENTIAL PRODUCTION PROBLEMS:

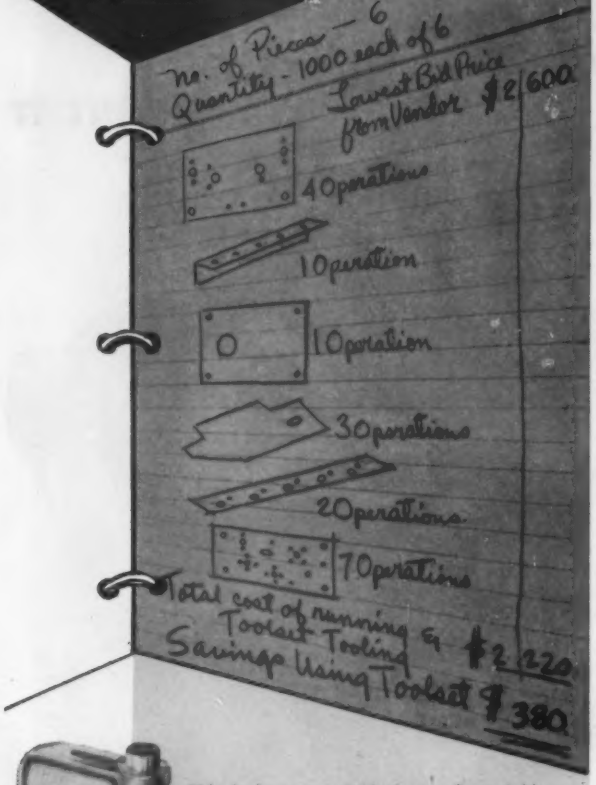
AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES for PRECISION BLANKING

1BA55

Figure your Stamping Savings like this with—

TOOLSET

Adjustable Tooling



This is how one Toolset user figured his savings. However, this is only part of the story. Besides the $380.00 saved our customer still has his Toolset tooling which he will continue to use on many more jobs . . . on which his savings will be even greater. What better way to cut stamping costs . . . Use Toolset.

Toolset Hole Punching and Notching Units give you closer hole centers, faster set-up, longer spring life, complete interchangeability. Available in widths from ¾" to 3½", throat depths from 4" to 16". Standard punches available in round, square, rectangular, up to 2⅛" dia. Special and larger shapes available.

TOOLSET

Division of
General Riveters Inc.

779 Hertel Ave. Buffalo 7, N. Y.

Start cutting costs NOW — Send coupon for Catalog of complete Toolset Line.

Toolset, Division of General Riveters, Inc.
779 Hertel Ave.
Buffalo 7, N. Y.

Gentlemen:
Please furnish a copy of your Catalog on Hole Punching and Notching Units.

Name _____

Title _____

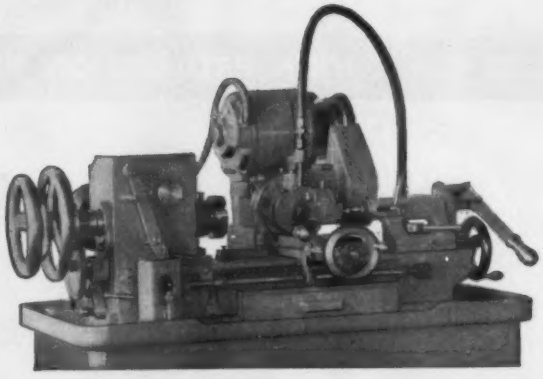
Firm _____

Address _____

City _____ Zone ____ State _____

IMPROVED **THREAD MILLING**

WALTHAM **MACHINES**



Several improvements in design have recently been made that are not mentioned in our descriptive bulletin. Send for supplementary sheet that lists these improvements and presents an illustration of the whole machine.

WALTHAM MACHINE WORKS, INC.
HIGH STREET, WALTHAM, MASSACHUSETTS

53% of U.S. grinding machines are *at least 10 years old*

53% of all U.S. grinding machines were, in 1953, 10 or more years old. For instance, 16% were more than 20, while 37% were at least 10 years old. Have you added the years together to find the age of *your* grinding machines?

CENTERING
MACHINES

• HAND • SEMI-AUTOMATIC • AUTOMATIC

Special Machinery

HEBERT Equipment Co. • Romeo, Mich.

POPE **PRECISION SPINDLES**
for Grinding, Boring, Milling

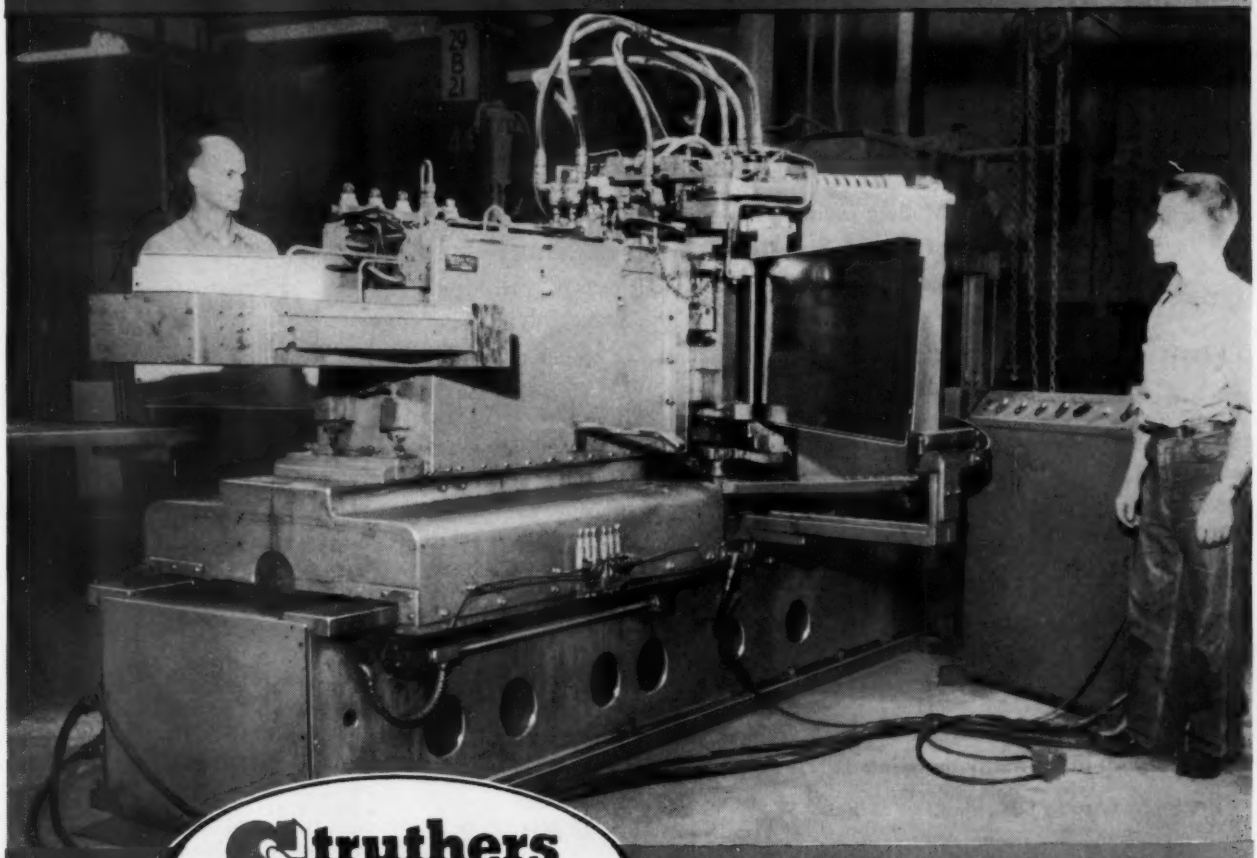
Belt Driven • Motorized • High Cycle • Special

Let us send you Data Sheets

POPE MACHINERY CORP., 261 River St., Haverhill, Mass.

For Norge DIVISION BORG-WARNER CORPORATION

—fast, Automatic Cabinet Forming in Refrigerator Production



with Struthers Wells Double Wing TANGENT BENDERS

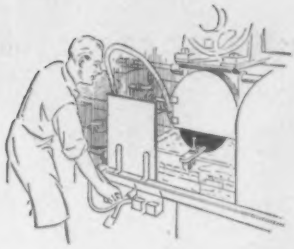
At the Muskegon Heights, Michigan plant of NORGE Division of Borg-Warner Corporation, rapid and efficient forming of refrigerator cabinet wrap-arounds is provided by Struthers Wells Tangent Benders. These modern machines radially edge-bend the pre-formed, flanged sheets into cabinet form in one smooth operation—completely automatic except for loading. • Write for our descriptive Tangent Bender Brochure—let us consult on your needs.

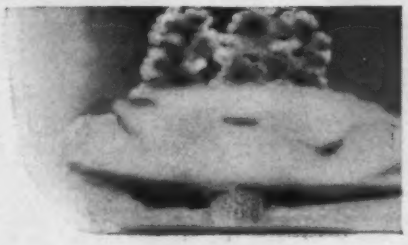
MACHINERY DIVISION

STRUTHERS WELLS CORPORATION

Titusville, Pa.

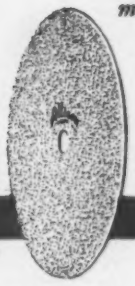
Offices in Principal Cities





HOW *ABRASIVE* CUTTING GAVE *EACH* A VALUABLE ASSIST!

Modern industry recognizes the key importance of "new" high-temperature-resistant alloys in the development of jet engines and atomic energy. Neither development would have been possible otherwise. Yet too few production managers know about the valuable assist rendered by Allison Abrasive Cutting. *Abrasive cutting has consistently proved itself the only economical and efficient method for cutting these extremely tough wonder metals.*



Allison wheels have been developed to cut any of these metals. They are standard wheels, requiring no special machines or cutting techniques.

Tough Cut-Off Jobs Are Easy . . . with Allison.

3AL54B

The *best* way to cut many materials . . . the *only* way to cut some.

Allison ABRASIVE CUTTING WHEELS

THE ALLISON CO., 256 ISLAND BROOK AVENUE, BRIDGEPORT 8, CONN.

RUST-LICK

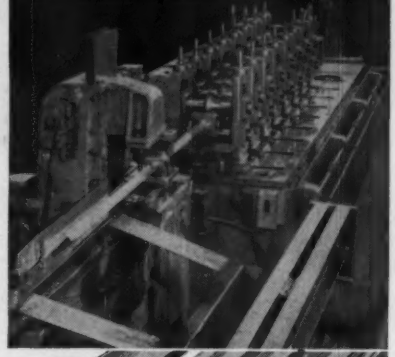
WATER SOLUBLE - NON-FLAMMABLE - RUST PREVENTIVE

RUST-LICK "C-W-25" provides the latest development for a Non-flammable, Cold Dipping or Spraying solution for the protection of finished ferrous parts, assemblies, raw stock and between operations. Mixes readily with cold water and upon drying a thin oily film plates-out and protects surfaces from corrosion during indoor storage.

Write, phone or wire for sample and literature.

PRODUCTION SPECIALTIES, INC.
755 BOYLSTON ST., BOSTON 16, MASS.

COLD-ROLL-FORMING



for the Growing Business

● As your business grows, new opportunities arise for drastic cost reduction through the use of cold-roll-formed parts or finished products. Decorative metal mouldings is only one of a great many things you can make with a Yoder cold-roll forming machine.

You can, for instance, make structural angles, channels, etc., up to ½ in. thick. You can form wide sheets or panels into cabinets for refrigerators, ironers, lockers, radio and TV sets, etc. You can make virtually all the components for metal buildings, including trusses, joists, studs, siding, roofing, windows, and doors.

You can, in addition, do perforating, notching, embossing, coiling, curving, welding, etc. Sections can be cut to length and ends given almost any shape, plain or fancy, by means of one or two Yoder automatic cut-off machines synchronized with the forming machine.

The Yoder Book on Cold-Roll-Forming is a valuable source of information on the scope, mechanics and economics of the art. Send for free copy.

THE YODER COMPANY
5519 Walworth Ave., Cleveland 2, Ohio

Cold-Roll FORMING MACHINES

ENGINEERING YODER MANUFACTURING

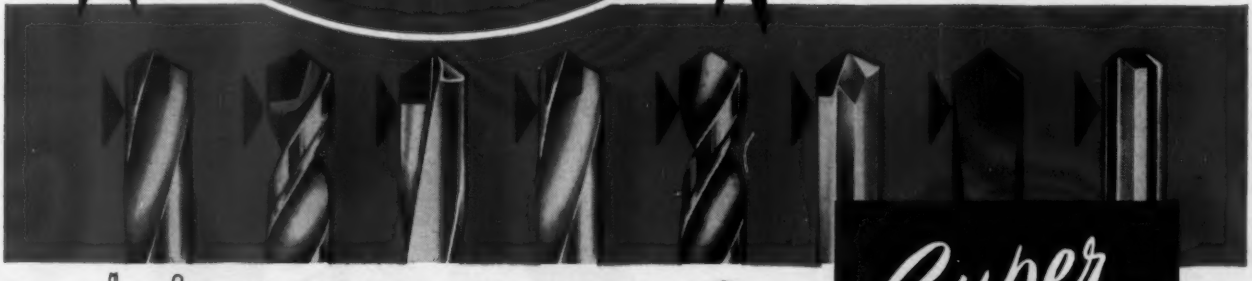
For Every Carbide Drilling Application There's a STANDARD SUPER DRILL

NEW and really super!

Six points of superiority— Result of two years' research. Extensive tests indicate it's the most durable and the fastest cutting carbide twist drill developed to date. Feeds as high as 8" per minute in cast iron have been obtained. Stocked in fractional, wire and letter sizes for your convenience.

NEW LOW PRICES

Write to Dept. 343 for new Catalog No. 55



QUALITY CARBIDE TOOLS

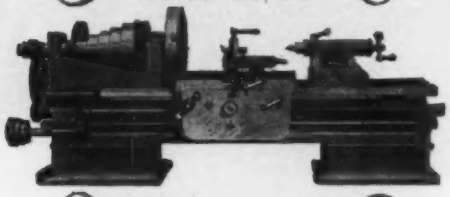
Super TOOL COMPANY

21650 Hoover Rd., Detroit 13, Michigan • 5210 San Fernando Rd., Los Angeles 3, California

5305

IN

1895



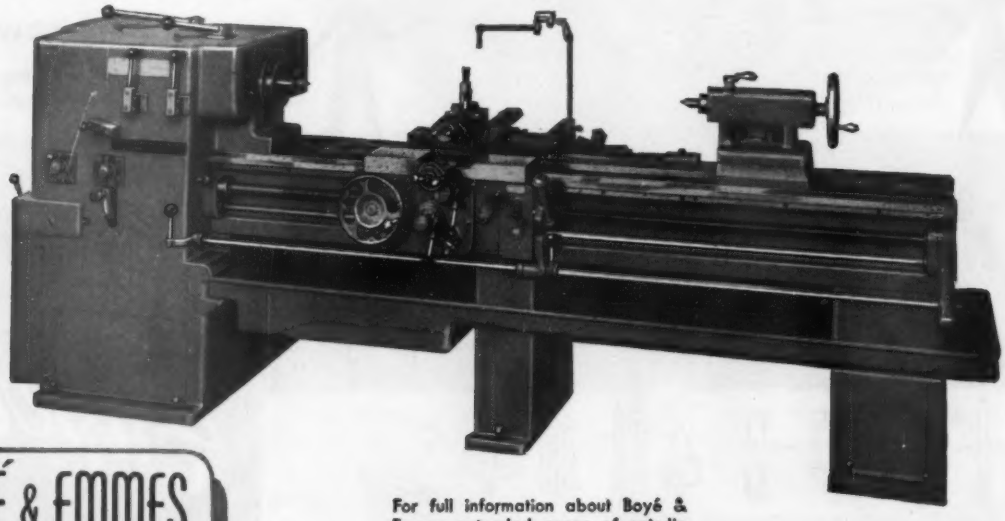
BOYÉ & EMMES LONG LIFE ENGINE LATHES *looked like this!*

• • •

. . . In that year the Boyé & Emmes design featured a single back gear, which doubled the number of spindle speeds previously considered adequate.

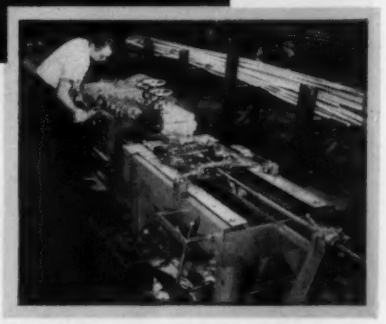
• • •

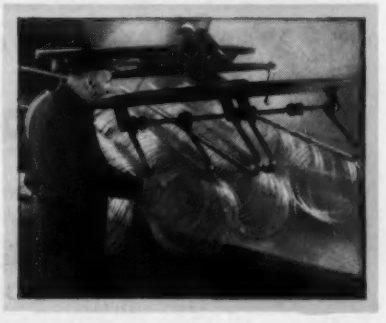
Today **BOYÉ & EMMES LONG LIFE ENGINE LATHES** incorporate the accumulated know-how of fifty-nine consecutive years of exclusive engine lathe manufacture.



BOYÉ & EMMES
MACHINE TOOL COMPANY
125 CALDWELL DRIVE
CINCINNATI 16, OHIO
MACHINE TOOL CENTER of the WORLD

For full information about Boyé & Emmes extended range of spindle speeds and other modern design changes write for FREE Bulletin 5305. Ask also for our new folder "Fifty-Nine Years of Engine Lathe Evolution."





The prize-winning 16 mm color movie— "THE SCIENCE OF MAKING BRASS"

"In 30 minutes I learned more about making brass than in a day's trip through the mill."

That's a typical reaction to this dramatic Chase film! "The Science of Making Brass" takes you on a guided tour of Chase mills—shows you exciting, full-color close-ups of every step in the making of brass and other copper alloys in the form of sheet, rod, wire and tube. If *you* work with metals, it's an experience you won't want to miss!

"The Science of Making Brass" is a 16 mm, full-color film with a running time of 29 minutes, and will be loaned to you on request. To arrange a showing, clip and mail the coupon below.

It won these PRIZES First Prize, International Competition for Technico-Industrial Documentary Films, Turin, Italy and Venetia Diploma at Venice Festival.

It won this PRAISE "Far superior..." (Colorado manufacturer) "Excellent in every respect..." (Large eastern manufacturer) "Finest ever seen..." (Texas distributor).

Chase

BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass & Copper

Albany†	Chicago	Detroit	Los Angeles	New York	St. Louis
Atlanta	Cincinnati	Grand Rapids†	Milwaukee	Philadelphia	San Francisco
Baltimore	Cleveland	Houston	Minneapolis	Pittsburgh	Seattle
Boston	Dallas	Indianapolis	Newark	Providence	Waterbury
Charlotte†	Denver	Kansas City, Mo.	New Orleans	Rochester†	(†sales office only)

To: Chase Brass & Copper Co., Incorporated
Waterbury 20, Conn. Dept. AM-355

Gentlemen:

_____ *Please send me more information on your 16 mm, full-color film, "The Science of Making Brass."*

_____ *I would like to arrange for a showing on or about* _____

NAME _____

POSITION _____

FIRM _____

ADDRESS _____

CITY _____ STATE _____

OUTSTANDING GEARS

Quality, Service, Delivery®

Over 62 years••• PHILLIE GEAR

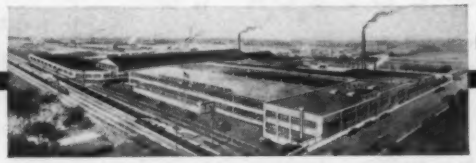
Outstanding, because every human and mechanical advantage in Gear making goes into their production: Experienced Designers, Trained Craftsmen, the most Modern Gear Cutting Machines, Up-to-the-minute Heat Treating Processes, Ever-watchful Inspectors, and Careful Shippers—all housed in Modern Buildings, and all under Management who have spent their lifetime in the Gear Business.

Add to these "Phillie Gear's" Courteous Service and Prompt Delivery, and you have a combination hard to beat . . . So, for Gears of any size or quantity, ***consult "Phillie Gear".***

Spur
Helical
Spur Internal
Helical Internal
Rack
Herringbone
Worm
Non-Metallic
Splines
Coniflex Bevel
Spiral Bevel
Zerol
Hypoid
Intermittent
Sprockets

PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
Virginia Gear & Machine Corp., Lynchburg, Va.

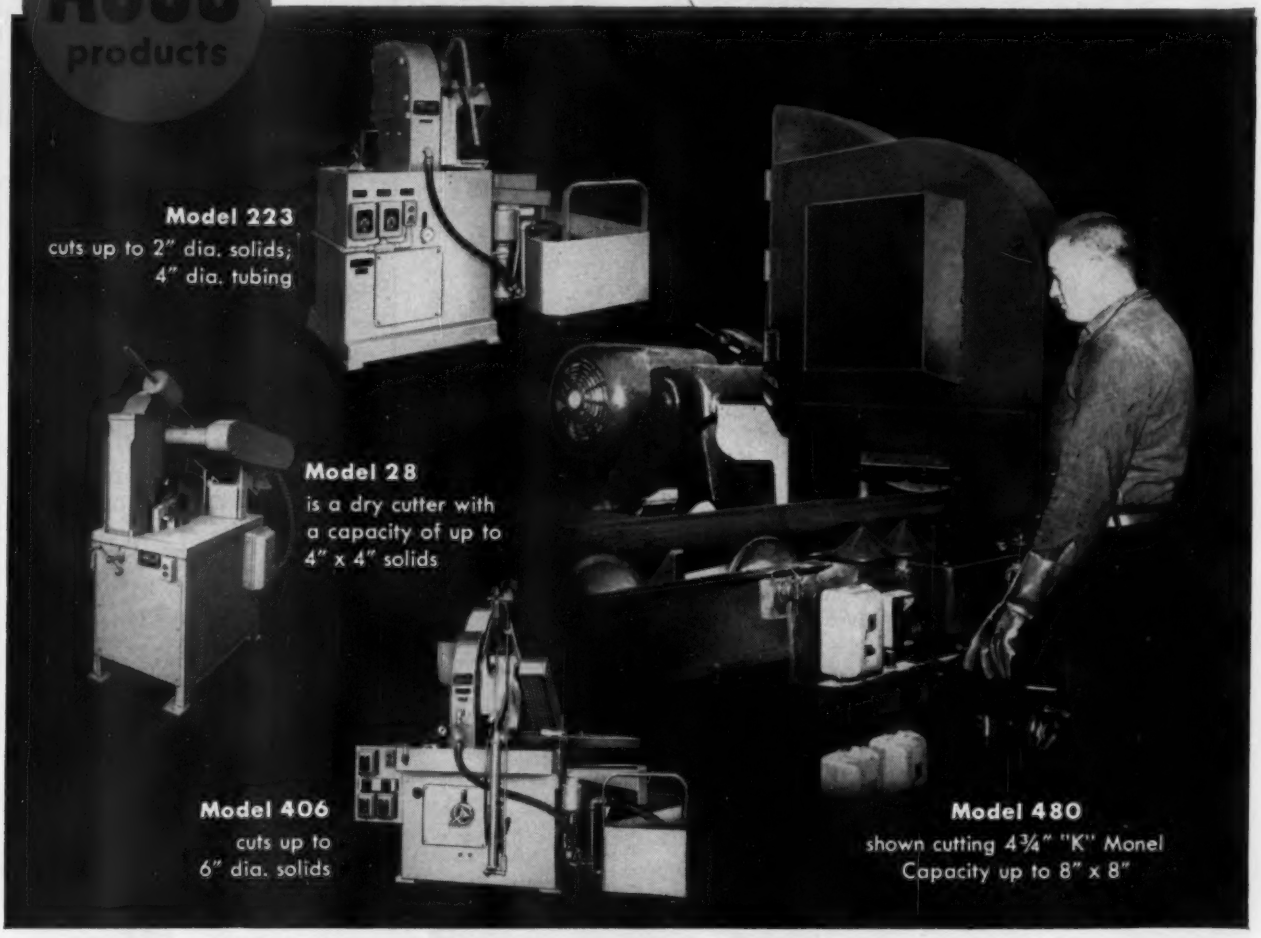


Industrial Gears & Speed Reducers

LimiTorque Valve Controls
ESTABLISHED 1892

Campbell Abrasive Cutters

ACCO products



Cuts alloy and high carbon steel quicker, smoother and more economically

• Faster cutting of alloy and high carbon steel stock by CAMPBELL Abrasive Cutters—much faster than by other methods—reduces your labor costs and the number of machines required.

But that's only a start on the savings that the CAMPBELL abrasive cutting method makes possible. Large savings of materials result from the close tolerances, smooth finish and straight cuts with CAMPBELL cutters. Finishing time and costs are reduced as these machines cut all kinds of stock without surface hardening and with smooth finish.

CAMPBELL offers you the widest range of plus-services—

Superior sales engineering services—CAMPBELL experts are fully experienced in every type of cutting problem. They will help you select the machine best fitted to your requirement. They are available for consultation on cutting problems at any time.

Economy and speed of operation—CAMPBELL Abrasive Cutters handle every type of cutting job with accuracy, efficiency and economy. The big MODEL 480, for instance, cuts 4¾" diameter "K" Monel in two minutes per cut. The small MODEL 28 takes approximately 3 seconds per square inch of material.

Complete line of standard machines—It pays to select from a complete line. Only then are you sure that the abrasive cutter you buy is the one most profitable for your job. CAMPBELL Abrasive Cutters have many exclusive features. They are available as fully or semi-automatic equipment.

Consultation with trained CAMPBELL engineers will cost you nothing. It may show how to increase output per man hour.

Write for Bulletin DH-301 on "The Principles of Abrasive Cutting"

ACCO TRADE MARK

Campbell Machine Division
AMERICAN CHAIN & CABLE
923 Connecticut Avenue, Bridgeport 2, Connecticut

Wet and Dry Cutters and Nibblers

NEW!..

Lamina

GUIDE PIN BUSHINGS
FOR STANDARD AND SMALL DIE SETS

Now, you can mount Lamina guide pin bushings in standard and small die sets and realize the many advantages that only Lamina offers.

These small toe clamp type bushings were developed for use where mounting space is limited . . . designed to retain maximum die area. With bronze electroplated on hardened steel, strength is combined with free, smooth action to eliminate seizing and scoring. Full length bearing surface and precision fit assures perfect alignment and long life. Part rejects are minimized, die life is increased, press downtime and maintenance costs are reduced.

Lamina bushings are pre-finished on the inside diameter ***before*** assembly. Dimensions remain the same ***after*** assembly because the bushings are wring-fit in the die and securely held in position by specially designed retainers. Since distortion is eliminated, hand honing or fitting is not required.

These new Lamina guide pin bushings and other Lamina bushings are available in complete selection of styles, lengths, sizes and materials. Prices and dimensions are shown in our new catalog. Contact your die set manufacturer or write direct to us for your free copy.

Lamina
DIES AND TOOLS, INC.
P.O. BOX 31, ROYAL OAK, MICHIGAN

From the *American Machinist* Library of *Tips for Top Shop Men*

SABOTAGE is a greater potential danger for most plants than bombing. Have you taken any precautions to guard against it?

How to Work Clad Materials

Proper application of clad materials can cut costs and save scarce metal. Output of clad materials has more than doubled since 1946 . . . has climbed to more than 23,000 tons per year and may reach 1,000,000 tons by 1960. Clad materials offer advantages that may well have profit-wise applications in your business.

Clad materials are not difficult to work, require only care and routine experience. "How to Work Clad Materials," an *American Machinist* Special Editorial Report, contains all the latest facts on how to work clad materials most efficiently and profitably. This 16-page report, complete with informative drawings, diagrams, and photographs, is still available for only 25¢ a copy. Write to Reader Service Department:

American Machinist
McGraw-Hill Building
New York 36, N. Y.

More Filing per File

You Can Feel the Difference
in a "Red Tang's" faster, easier cutting action.

You Can See the Difference
in smoother, cleaner finished filing . . . and longer-lasting sharpness.

FREE "FILE FACTS"
Learn more about "Red Tangs" and their application, send for this free 32-page booklet.

Precision cut for uniform tooth height and sharpness; scientifically heat-treated and "prover-tested" for hardness, toughness, straightness and edge-holding ability; and carefully checked for uniformity, "Red Tang" Files remove more metal with less effort, wear better and stay sharp longer. *Grade A only* in all standard shapes and sizes for machine shop use.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.

"RED TANG" FILES

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que. Simonds Divisions: Simonds Steel Mill, Lockport, N. Y. Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

Fo. Fast Service from Complete Stocks Call your

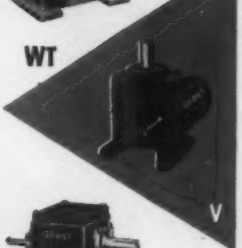
SIMONDS Industrial Supply DISTRIBUTOR

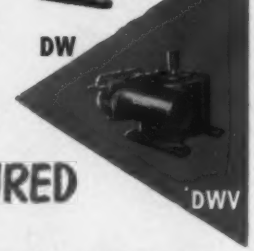
for trouble-free service

Grant Speed Reducers pay off!

Whatever your speed reducer requirements, GRANT can supply any one of eight different types, each manufactured in a complete range of sizes.

Or if your need be something special, GRANT will make a Speed Reducer to your specifications.





PAY-OFF ASSURED

GRANT Speed Reducers, with precision-cut gears and accurately ground shafts encased in cast iron housings, assure you of long, trouble-free service.

Write for GRANT's new catalog for information on their complete line of gears and reducers.

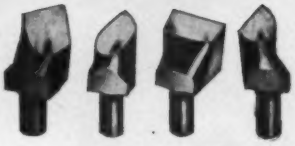
GRANT GEAR WORKS INC.

[illegible] West Second Street Boston 27, Mass.

APEX TOOLS

INSERTED-BLADE MILLING CUTTERS AND SINGLE-POINT TOOLS FOR ALL METAL-CUTTING NEEDS

APEX TOOL BITS FIT MOST STANDARD HOLDERS



If you haven't yet changed to Apex, you can begin to get acquainted by using Apex Bits in your present holders. The Apex line includes Single-Point Round Shank (as shown) and Shankless Serrated — plus Inserted-Blade Milling Cutters of all different styles. Write for catalog.

PROMPT SHIPMENT FROM OUR LARGE, COMPLETE STOCK

APEX TOOL & CUTTER CO., Inc., Shelton 10, Conn.

SIGOURNEY M-100 the PRECISION BENCH DRILLING MACHINE

No ordinary bench drilling machine, but an extremely accurate, high speed, sensitive machine for precision drilling. Drills from ¼" down to extremely small sizes. Successfully used down as far as .008".

Table and column exactly squared, one to the other, and built with strength and rigidity for maintained accuracy. Hardened and ground spindles insure long life. Sealed ball bearings throughout for smooth operation from 4,000 r.p.m. to 10,000 r.p.m. Motor, driving belt, and spindles entirely enclosed for safety. Available with 1, 2, 3 and 4 spindles.

SEND FOR ILLUSTRATED BULLETIN

THE SIGOURNEY TOOL CO.
HARTFORD 6, CONN.

Sole Sales Agent
PRATT & WHITNEY
Division Niles-Bement-Pond Co. West Hartford, Connecticut

The BUY word for Socket Cap Screws is ALLEN

The *easy* way to make sure of greater strength, better fit and uniform quality in socket cap screws is to order "not just Allen-type but genuine ALLEN."

PRESSUR-FORMING

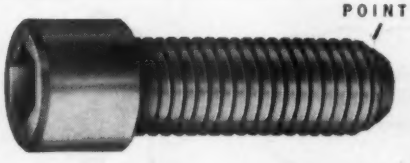
The latest improvement in the cold forging method originated by Allen. The tough Allenoy steel fibers are preserved continuous and uncut.

GRIP HEAD CAP SCREWS
The world's easiest starting, straightest driving, firmest holding cap screws.

FLAT HEAD CAP SCREWS
For firm fastening with flush surfaces. Especially adapted to fastening thin plates and sheets.

BUTTON HEAD CAP SCREWS
Produces smooth streamlined appearance where countersinking is impractical.

STAINLESS STEEL



Bright, non-corroding, high tensile strength type 18-8. 151 popular sizes (NC & NF) *available from stock.*

THE ALLENUT

Provides a ready-made threaded hole for use with cap screws in soft materials and for repair applications. Endless uses for compact design, space saving.

Sold Only Through

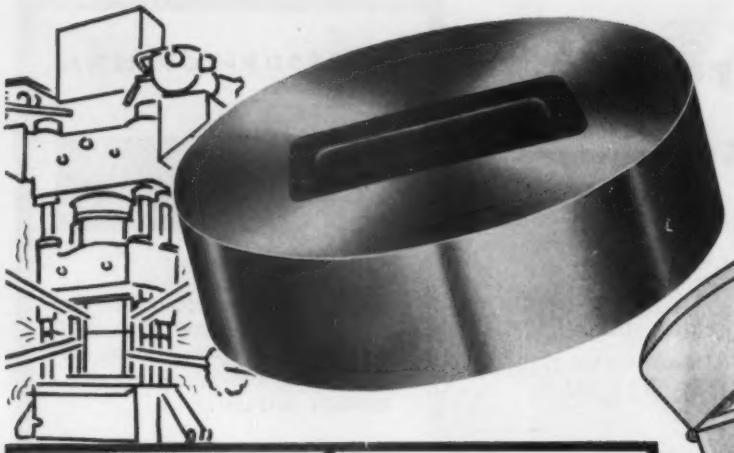
Leading

Industrial Distributors

Take advantage of their large stocks and fastener experience. Write direct for General Catalog G55.

ALLEN
MANUFACTURING COMPANY
Hartford 2, Connecticut, U.S.A.

ALLEN HEAD



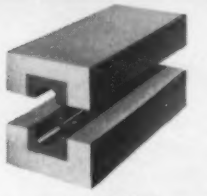
12,979,660 LIGHTER CASES WITH TALIDE DIES

A leading producer of cigarette lighter cases was experiencing considerable trouble using steel dies. An excessive number of lighter cases were being scrapped due to tears and deformation. Die cost was running $.028 per lighter. Operation involves drawing .020" thick carbon steel on A-3 Niagara presses, 45 strokes per minute.

Our die engineers were called in, and after installing specially designed Talide dies on customer's press line, rejects were eliminated, as well as time previously spent in buffing and polishing the cases after drawing. Subsequent plating expense was reduced ⅓ due to the smoother surface on the cases drawn.

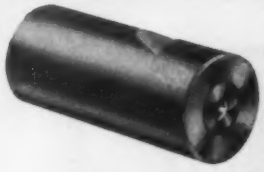
The original 15 Talide dies placed in production have now drawn a total of 12,979,660 cases for an average life of 865,310 per die. Previous steel dies produced an average of 15,000 cases per die. Die life was therefore increased 58-1 after the installation of Talide dies.

Die cost has now been reduced to $.0008 per lighter drawn, and customer estimates his saving for the past year, using Talide dies, has been at least $25,000.



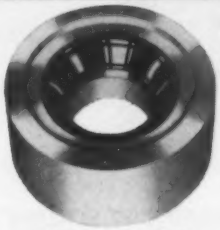
SWAGING DIES

Leading Fountain Pen Manufacturer cold swages 33 times more stainless steel parts with TALIDE dies.



HEADING AND EXTRUSION DIES

Cold-heading ¾" carriage bolts, TALIDE dies produced 1,500,000 pieces, steel dies only 50,000.

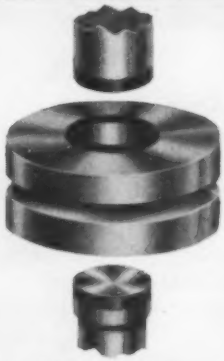


SHEET METAL DIES

137,000 hi-alloy steel Pressure Vessels drawn with TALIDE, against only 7,900 with steel dies previously used.

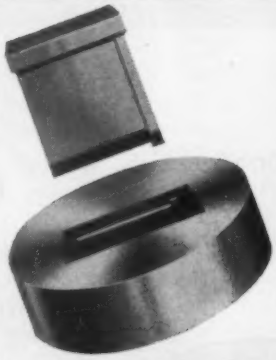
CURLING ROLLERS

TALIDE Curling Rolls last 65 times longer than steel rolls on beverage can forming operation.



POWDERED METALLURGY DIES

Pill dies of TALIDE metal outlast steel dies 100 to 1 while reducing rejects 82%.



BLANKING AND FORMING DIES

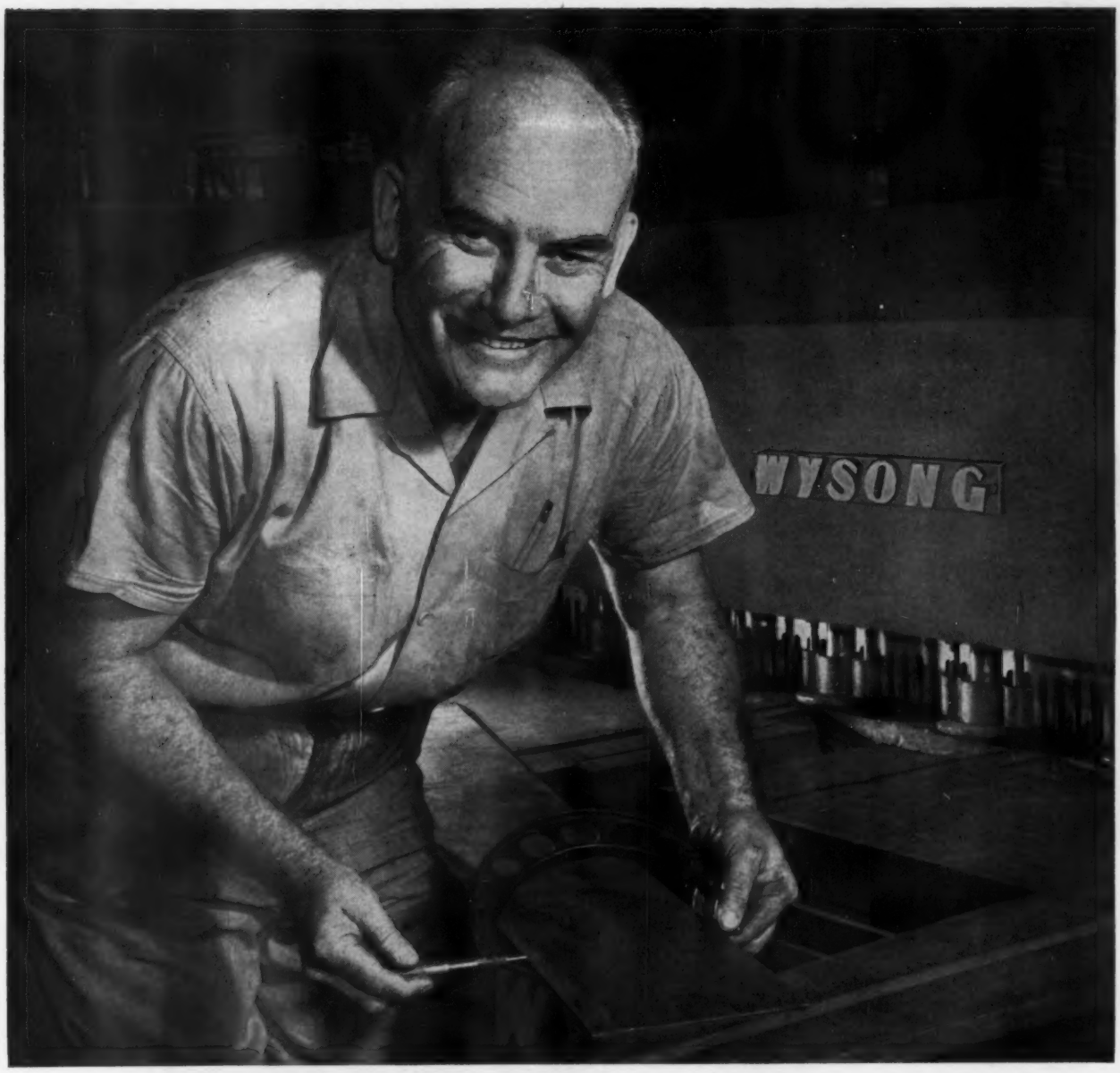
70 times more paper discs blanked out with TALIDE—over hard alloy die.

IMPROVED QUALITY

Additional refinements and improvements in our process have added still longer life to the wearing edges of Talide tools, dies and wear-resistant parts. The result is a carbide having a new, unique grain structure with harder and tougher properties than previous grades. Laboratory tests reveal our improved grades possess 25% greater strength and rigidity. Service life per grind up to 50% longer than previous grades has been proven in grueling field tests.

"Year after year—you can rely on TALIDE METAL for uniform results and consistent quality."
METAL CARBIDES CORPORATION
MC
TALIDE®
YOUNGSTOWN 7, OHIO
HOT PRESSED AND SINTERED CARBIDES · VACUUM METALS
HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

Send for new 84-page Catalog 55-G or ask for sales engineer to call.



SHEAR SATISFACTION!

When you use a Wysong, you will know what I mean—a clean, *accurate* cut and complete confidence that the next cut will be just like it.

Wysong Shears are designed and built for that kind of shearing — rugged enough to withstand the shock of capacity shearing, rigid enough to maintain accurate alignment.

You will want to know about the rigid, hi-tensile castings; the drive unit which runs in oil; the non-repeat unit; the positive, compensating holddown; the ball-bearing precision back gauge; and other superior Wysong features. They add up to SHEAR SATISFACTION—for the boss and the operator, too.

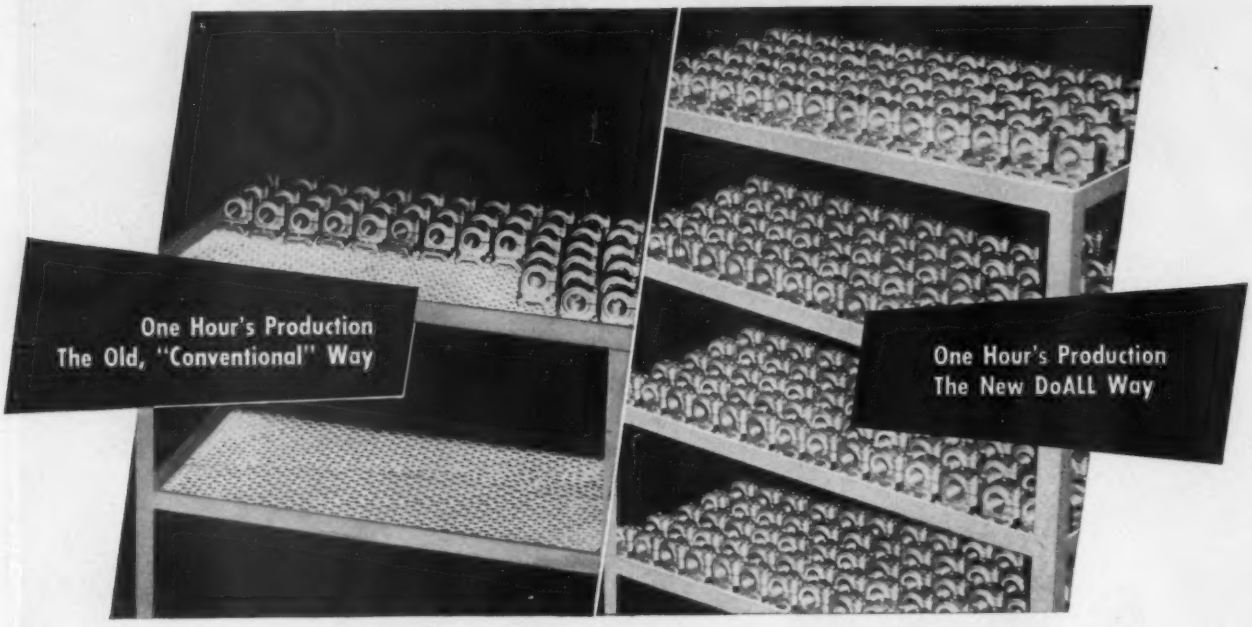
Before you buy, investigate WYSONG . . . it's MILES ahead! See your dealer or write factory for new catalog.

WYSONG

WYSONG AND MILES COMPANY • GREENSBORO, NORTH CAROLINA

Builders of Precision Machines For Over Fifty Years.

There is a New Machining Concept to Cut Your Production Costs



THE pictures above show the cost-reduction opportunities of modern production band machining! The job is that of cutting slots in cast bronze clamps. Formerly done with a slitting saw on a milling machine, production was about 38 pieces per hour. Now done with a DoALL production band machine, production is nearly 250 pieces per hour.

Look at the simple, inexpensive fixture shown at the right. Slip the work in position, push a button and the hydraulic power feed table carries it into the continuous-cutting band tool. Upon completion of the cut the table backs out. An integral coolant system promotes high cutting rates, insures good finishes.

Great usefulness of the machine is assured by the "non-restricted geometry" of band machining—cuts in the workpiece can be made at any angle or in any direction.

Faster cutting, greater versatility, simpler fixturing, lower tool cost, lower capital investment—production band machining is the

cost-reducing answer to thousands of production machining operations. Ask for a free demonstration at your plant. Call your local DoALL Store (see classified directory), or write: *The DoALL Co., Des Plaines, Ill.*

DoALL

PB-11

NEW COLOR FILM—"Production Band Machining" now available showing operation of this new machining concept.

Call Your DoALL Service-Store
DoALL
SAW BANDS
DoALL GRANITE PLATES
Machine Tools • Cutting Tools • Measuring Instruments
Shop Supplies • In Stock
The DoALL Company, Des Plaines, Ill.

EDUCATIONAL STUDY WALL CHARTS
Economic Principles
$1.00 each postpaid
Lower quantity prices.

Friendly DoALL Stores... (in 40 cities)

Personalized Service...Complete Stocks...Local Delivery

OK and ON TIME

...from YOUR GEAR DEPARTMENT

Using our facilities as *your gear department* puts our entire organization on your team with production-line precision. Gears—constantly to your specifications—arrive on schedule, and you are relieved of the responsibilities of building and maintaining a gear department equal to your requirements in *know-how* and production facilities.

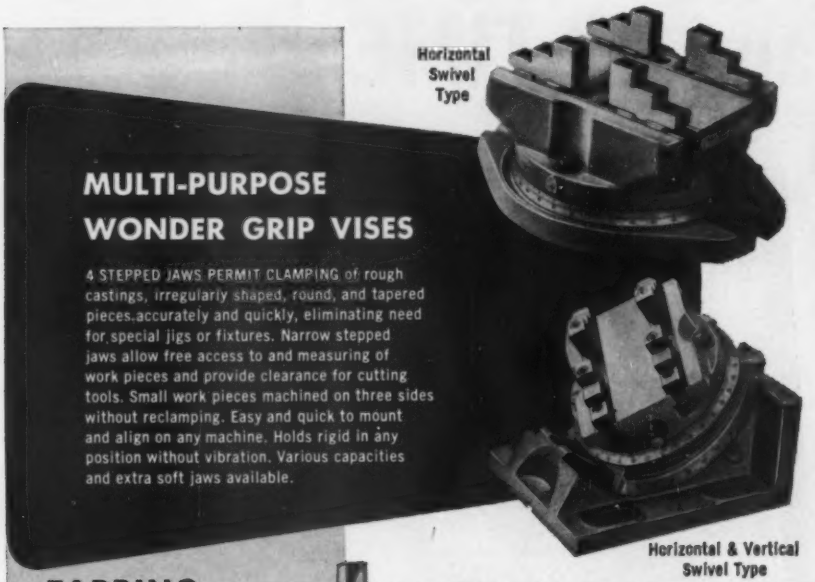
Most of our customers use us in this manner—employing our experience in the solution of gear problems—placing confidence in a company whose sole business is gears, and whose business has been built on living up to both specifications and expectations. May we discuss such a mutually advantageous arrangement with you?

DOUBLE DIAMOND TRADE MARK GEARS

FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS
GEAR-MAKERS TO LEADING MANUFACTURERS

Automotive Gear Works, inc.

ESTABLISHED IN 1914 RICHMOND, INDIANA



MULTI-PURPOSE WONDER GRIP VISES

4 STEPPED JAWS PERMIT CLAMPING of rough castings, irregularly shaped, round, and tapered pieces accurately and quickly, eliminating need for special jigs or fixtures. Narrow stepped jaws allow free access to and measuring of work pieces and provide clearance for cutting tools. Small work pieces machined on three sides without reclamping. Easy and quick to mount and align on any machine. Holds rigid in any position without vibration. Various capacities and extra soft jaws available.

Horizontal & Vertical Swivel Type

TAPPING ATTACHMENTS

Reversible safety tapping attachments with adjustable graduated friction drive, hardened, ground and lapped, complete with torque bar and handles. Precision made throughout by long established reputable West German factory.

Tested for Performance to High Amer. Standards
Immediate Delivery from N.Y. Stock
MADE IN GERMANY
Low Competitive Prices

- Quick Change Chucks and Collets
- Wille-Grip Keyless Drill Chucks
- Milling Machine Arbors, Adapters, Arbor Spacers and Bearings
- Lathe Mandrels

DISTRIBUTOR INQUIRIES INVITED

Also United States Distributors of European Machine Tools

Our Headquarters in New York City

Write for complete details and prices to Dept. 20

M.B.I. EXPORT & IMPORT LTD.

A Division of Machinery Builders Inc.
475 Grand Concourse, Bronx 51, N. Y.
"Over 20 years experience in designing and building machinery"
CABLE ADDRESS: Machbuild New York
Phone: MOtt Haven 5-0900

From the *American Machinist* Library of *Tips for Top Shop Men*

THE really competent man multiplies his effectiveness by every man he influences. One man, no matter how able, is still one man, but one man believed in by enough others is unbeatable.

Over-age Machines Cost You Money!

Over 42 per cent of metalworking production equipment was over 10 years of age in 1949 . . . 19 per cent was bought more than 20 years ago. These machines have had an average of a quarter century of use, including five years of wartime overwork and mistreatment.

How does *your* production machinery and equipment compare with your competitors', and with the Metalworking Industry's in general? The answers will be found in the *American Machinist* Mid-Century Inventory of Metalworking Production Equipment.

Here are all the facts on the age and number of 155 major types of production equipment operating in 15 metalworking divisions and 25 major production areas. Cost is $2.00 per copy.

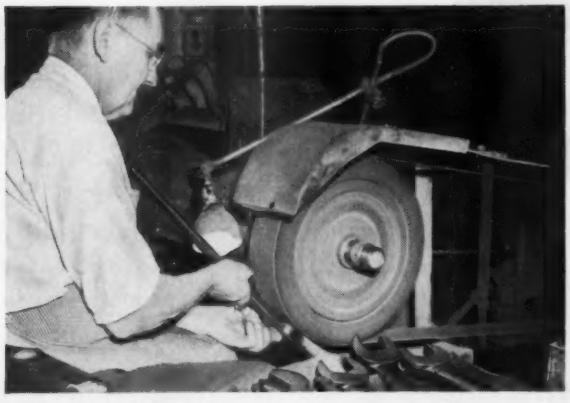
Write Reader Service Department:

American Machinist
McGraw-Hill Building
New York 36, N. Y.

HOW WOULD YOU SOLVE IT?

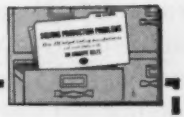
1 PRODUCTION PROBLEM: To speed production and cut unit costs of removing forged flash from steel open-end wrenches. Billings and Spencer found that hard wheels were too slow, left unsatisfactory finishes, tired operators.

2 SOLUTION: A 3M Representative studied this production problem. After analysis, he recommended that this Hartford, Connecticut manufacturer switch to the 3M Method using Three-M-ite type belts on a backstand grinder.



3 RESULTS: Better finishes. An immediate production increase of 140%—from 75 to 180 pieces per hour. Each belt finishes up to 150 pieces (and then is used for *other* operations) with far less operator fatigue. A 3M Representative can solve *your* problems, too.

WANT MORE INFORMATION?



MINNESOTA MINING AND MFG. CO.
Dept. AM-35, St. Paul 6, Minn.

☐ Send me free booklet: "Case History Reports on 3M Abrasive Belts"

☐ Please have 3M Representative call.

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....ZONE...STATE.....

3M ABRASIVES

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export: 99 Park Ave., New York 16, New York. Makers of "SCOTCH" Brand Pressure-Sensitive Tapes, "SCOTCH" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

Typical application for Atlantic cutting oils, showing a Barber-Colman milling machine.

NEW ATLANTIC cutting oils

for high production on tough jobs

Here at last is really effective help in keeping production high in your milling, turning, and drilling departments.

With these new Atlantic non-soluble cutting oils, you can maintain high production rates without the handicap of foul odors on hot tough jobs. Work is visible right through the oil. And the oils are compatible when blended—even down to the heaviest grades. Operators like these new oils better too, because they don't indelibly stain hands or clothing.

Get complete information on these new oils and your copy of the Atlantic Cutting Oil Selection Chart. Learn about this superior measure for cutting oil efficiency . . . determined by performance rather than chemical composition. Write your nearby Atlantic office listed below, or The Atlantic Refining Company, 260 South Broad St., Philadelphia 1, Pa.

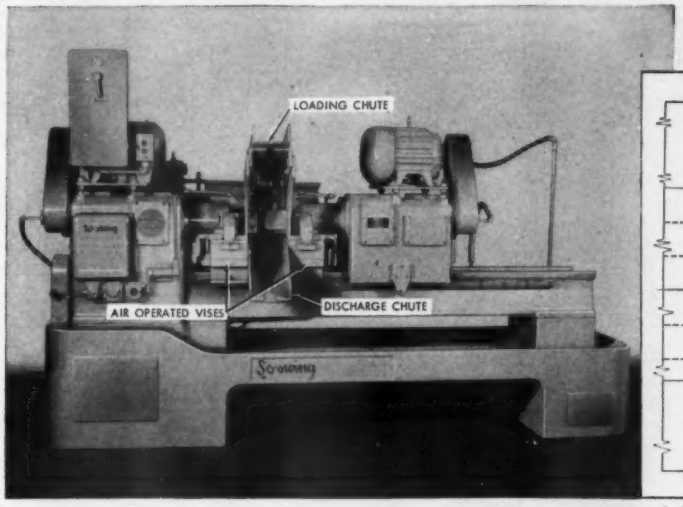
ATLANTIC

LUBRICANTS • WAXES
PROCESS PRODUCTS

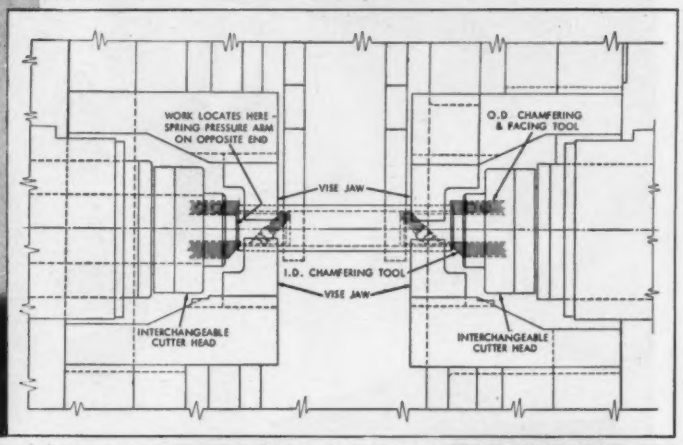
PROVIDENCE, R. I. 430 Hospital Trust Bldg.
SYRACUSE, N. Y. Salina and Genesee Sts.
READING, PA. First and Penn Aves.
PITTSBURGH, PA. Chamber of Commerce Bldg.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-swing PEOPLE" SENECA FALLS, NEW YORK



TOOLING LAYOUT


WORK LOCATES HERE - SPRING PRESSURE ARM ON OPPOSITE END
O.D. CHAMFERING & FACING TOOL
VISE JAW
I.D. CHAMFERING TOOL
VISE JAW
INTERCHANGEABLE CUTTER HEAD
INTERCHANGEABLE CUTTER HEAD

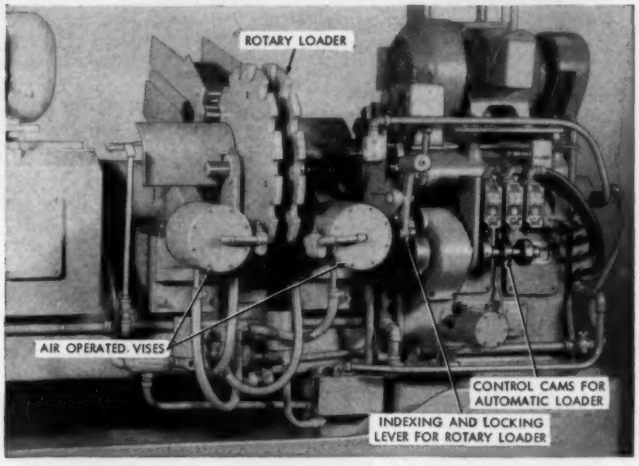
BEARING TUBES HANDLED AND MACHINED AUTOMATICALLY ON MODEL CS DRILLING AND CENTERING MACHINE

PROBLEM: To automatically load and unload Bearing Tubes, bore both ends for a depth of 1-5/8", face to length and chamfer inside and outside diameters on both ends.

SOLUTION: The Model CS Automatic Drilling Machine selected for this job was equipped with Special Rotary Type Automatic Handling Equipment and Semi-standard, Air-Operated Vises shown in the illustration.

The tubes, previously cut to length, arrive by conveyor and are fed by gravity into the rotary loader from the loading chute mounted on the front of the machine. The rotary loader is indexed in timed relation to the machine cycle and carries the parts into working position where they are clamped in the air-operated vises.

The tubes are accurately located endwise in the vises by means of a fixed stop on one end and a spring-loaded pressure arm on the opposite end. After the parts are securely clamped, the cutter



heads advance in rapid traverse, slow down to normal feed during the boring, facing and chamfering operations, and then return in rapid traverse to the starting position. The vise jaws open as soon as the tools clear the work, and the rotary loader indexes a rough part into working position while discharging the finished part into the discharge chute.

The operation is entirely automatic. One operator can look after several machines. A production of 265 pieces per hour is easily maintained. Seneca Falls engineers are at your disposal to help solve your AUTOMATION problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH So-swing

SAVE
MACHINING COSTS
—WITH NEW DISSTON
HOT ROLLED STAINLESS
STEEL SHAPES

Here's big news to *Stainless* users—especially those in the jet engine and automotive fields. From Disston—leaders for 100 years in the rolling of special shapes—comes a new specialized skill to help you solve rising costs of metal shaping. After years of experimentation and over a year of volume deliveries, Disston is ready to supply complex *stainless* steel shapes to *your* specifications.

Why not discuss your problem with Disston. Find out just how much you can save with this modern production technique. Write or call: Henry Disston and Sons, Inc., Steel Sales Division, 320 Tacony, Philadelphia 35, Pa., U.S.A. Disston makes stainless, carbon, alloy and tool steel in either standard or special shapes.

DISSTON
HAS THE EDGE®

in special purpose steels and special steel shapes.

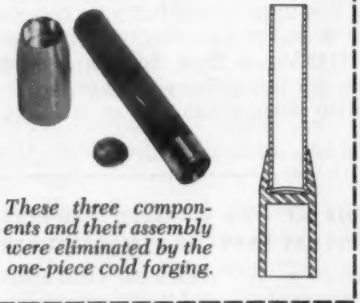
ENGINEERING OPPORTUNITIES—
Mechanical, Design, Sr. Draftsmen.
Forward complete resumé to
Personnel Division.

HUNTER DOUGLAS ONE-PIECE COLD FORGINGS

replace 3 piece unit, eliminate assembly, solve gas leakage problems!

A typical example of how Hunter Douglas cold forgings simplify everyday design problems

A most critical requirement in the production of an ordnance component was a perfect seal against the escape of high pressure gases. Fabrication by conventional procedures involved the assembly of three separate pieces—a screw machine part turned from bar stock and bored from each end; a separate sleeve machined from tubing, and a stamped Welsh plug. The three parts were unitized by expanding the Welsh plug within the sleeve, forcing walls into a machined groove within the head.

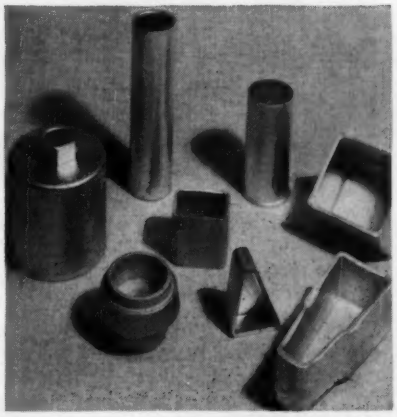


These three components and their assembly were eliminated by the one-piece cold forging.

To simplify the design, insure leak-proof construction and eliminate costly machining and assembly time, Hunter Douglas engineers suggested a cold forging from HD-11-T6, a high strength aluminum alloy.

All internal and external diameters of the cold forged component are now formed in a single, instantaneous press operation. No joints exist to cause leakage, consequently rejects are negligible. The cold forging, being highly stressed, easily withstands bursting pressures of 5500 psi without distortion. With its remarkable simplification in design, the cold forging requires fewer machining operations, thus saving both time and unnecessary metal waste.

Hunter Douglas Cold Forgings can be mass-produced in any required numbers and to cover a tremendous range of design requirements. If your components require *walls of zero draft, high physical properties, employ tubular shapes with or without a closed end, and must meet close dimensional tolerances,* HUNTER DOUGLAS COLD FORGINGS may provide the answer. Our engineers will give you a prompt analysis upon submission of a blueprint or sample part.



Hunter Douglas Cold Forgings cover a multitude of needs. Note wide variation in part geometry. Many complex designs formerly considered impossible to produce by cold forging now respond to new techniques developed at Hunter Douglas.

DESIGNERS:
If you want to know more about Hunter Douglas Cold Forgings write on your company letterhead for this free 40 page book, now on the press!

Hunter Douglas Corporation

HUNTER DOUGLAS CORPORATION • DEPT. AM-3, RIVERSIDE, CALIFORNIA TELEPHONE OVerland 3-3030

$4800?

$1800?

$367488

$2400?

$12,000?

What will an Eye Accident Cost You?

The figures above are the actual costs *in compensation alone* of five recent industrial eye accidents in five different companies. Six eyes were lost.

We've been saying that "eye accidents cost over $5.00 per *employed* worker per year" — but they can cost you vastly more per *injured* worker — particularly if you hit the jack pot. Your insurance is higher, your plant morale and efficiency are lower, a key machine may be idle, then there's the costs of first aid and medical treatment.

An AO† Eye Protection program by preventing 98% of these needless eye accidents will control these costs and pay for itself in less than 6 months. It will prevent a lot of pain and misery too. Always look for the AO monogram on safety lenses and frames. It is your guarantee that your company is receiving the finest in safety materials. Write American Optical Company, 5133 Vision Park, Southbridge, Mass., for booklet or ask an AO Safety Representative to call with the facts. An eye safety program can pay for itself *quickly!*

ONE OF AO'S QUALITY GOGGLES THAT PREVENT EYE ACCIDENTS

This is our F4100 Metal Ful-Vue Goggle with side shields. Lenses are heat strengthened and *individually tested.* You can't buy superior eye protection.

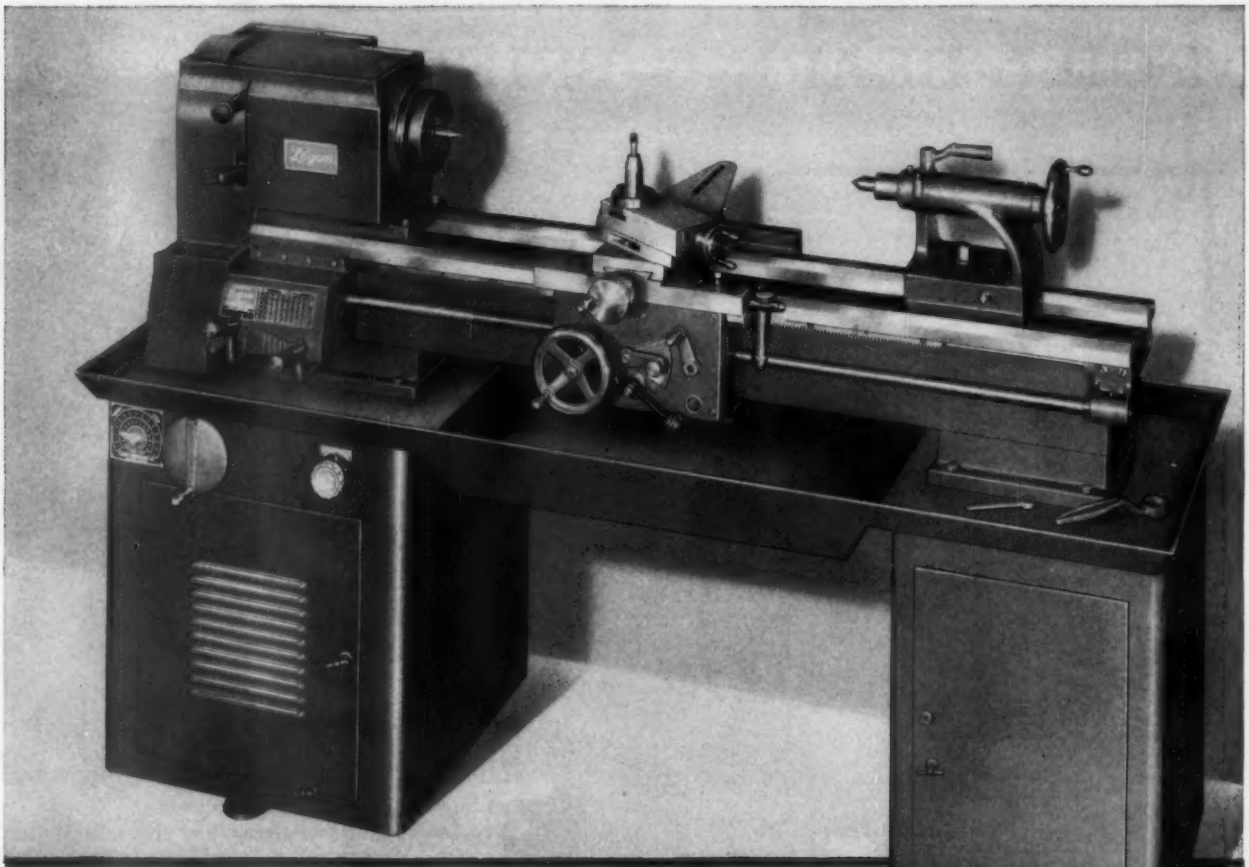
American Optical

SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

†T. M. REG. BY AMERICAN OPTICAL COMPANY

COPYRIGHT AMERICAN OPTICAL COMPANY, 1955



THIS NEW 14" *Logan* LATHE PERFORMS . . .

AND THE RESULTS PROVE ITS SUPERIORITY

The more jobs you watch this rugged new Logan "6560" perform, the more impressive it looks. On the heaviest cuts, or at maximum speed, it turns the work *smoothly,* quietly, with precision results. Better performance than you are conditioned to expect of a "good" 14" lathe is literally designed, engineered and built into the "6560".

The Variable Speed Drive provides instant rpm adjustment on work requiring variation of spindle speed. The oversize spindle, with 1⅜" bore, turns on a ball bearing mounting that needs no adjustment within the full range of 38 to 1200 rpm. The bed is a wide, deep special alloy casting, extra heavy and resistant to both internal and external stresses. The two V-ways and two flat ways are precision ground. There is extra strength in the wide gears, heavy bearing supports, massive headstock, carriage and base. This extra weight, plus dynamic balancing of the complete lathe practically eliminates vibration. Remarkably moderate price and low cost operation make the "6560" outstanding in economy as well as in precision performance. See it at your Logan Lathe dealer's, or write for Bulletin 14-L, giving a full description.

SPECIFICATIONS AND FEATURES

14⅝" swing over bed
9" swing over saddle
1⅜" spindle hole
1" collet capacity
40" between centers

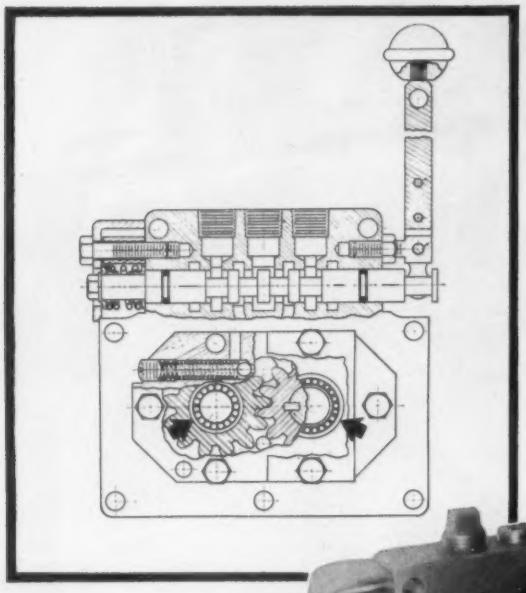
Variable Speed Drive
Ball Bearing Spindle
38 to 1200 rpm
Two-V-way, Two-flat way
Precision Ground Bed
Precision Carriage

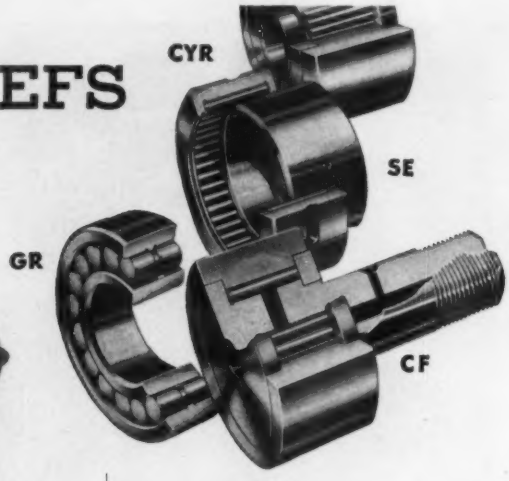
LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

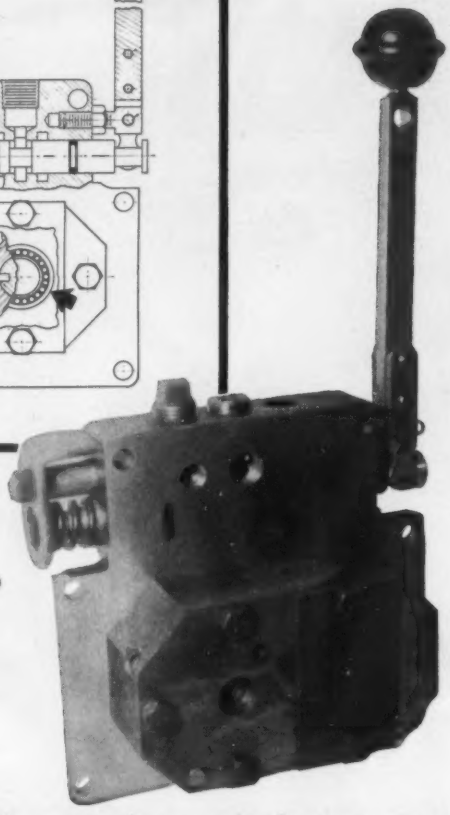
LOGAN ENGINEERING CO.

Lawrence and Lamon Ave., Chicago 30, Ill.

McGILL BEARING BRIEFS







GUIDEROL®

Bearing used in

ENERGY

hydraulic pumps for attachment to farm tractors

OUTWEARS PREVIOUS BEARING 15 to 1

The great load-carrying capacity and the compact size of the Guiderol Bearing are the principal reasons why Energy Farm Equipment Company of Monticello, Iowa, uses the Guiderol for gear support bearings in its hydraulic pump.

Energy reports, "We are one of the largest manufacturers of hydraulic pumps used as attachments to farm tractors . . . Our production is approximately 10,000 units a year and we owe much of our success to the excellent performance of the McGill Bearings used."

The report adds the overall product is improved because closer tolerances can be maintained, maintenance is reduced to zero and length of life is 15 times that of the bronze bearing previously used.

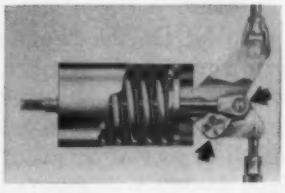
BEARING SELECTION GUIDE

A revised 140 page Bearing Selection Guide, complete with 30 pages of vital engineering data, has been released by the McGill Manufacturing Company. Ask for Catalog No. 52.

MARION HOISTS HANDLE HEAVIER LOADS WITH GUIDEROL® BEARINGS

Marion Heavy-Duty Hydraulic Hoists are built to "handle heavier loads with faster action" while withstanding extreme abuse. Four Guiderol GR-20 Bearings, used as gear support bearings in the pumping mechanism for these dump bodies, have the capacity and dependability for trouble-free operation under these tough operating conditions.

CAREFUL MATERIAL SELECTION DICTATES GUIDEROL® BEARINGS FOR NAVCO COUNTERPOISE HANGERS



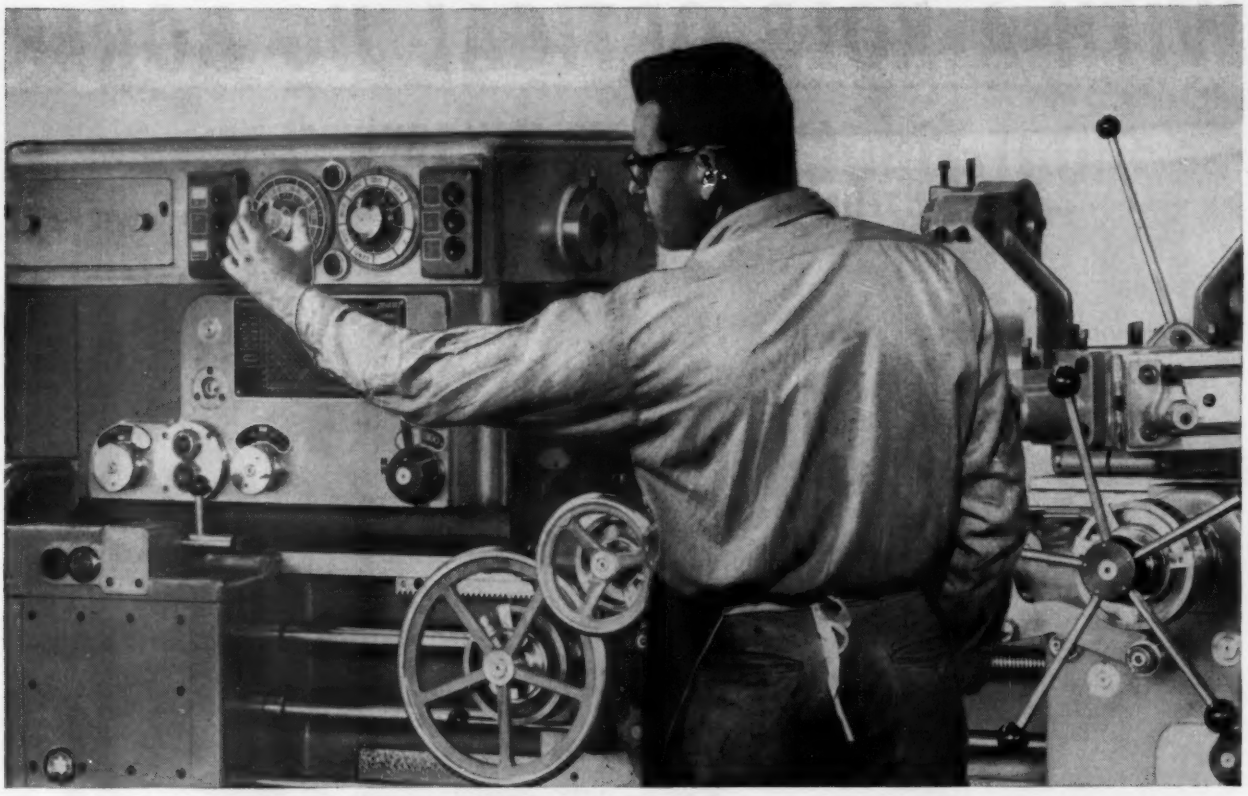
In its Counterpoise pipe hanger, National Valve and Manufacturing Company uses the best and most durable materials to enable it to carry loads up to 16,000 pounds and travels up to 12 inches. The entire hanger is designed to take advantage of the Guiderol capacity and performance.

50th Anniversary

McGILL design leadership has given you these important developments

★ First full-type roller bearing ★ First center guided full-type roller bearing ★ First Cam Follower roller bearing ★ First sealed roller bearing

McGILL MANUFACTURING COMPANY, INC., 300 N. LAFAYETTE ST., VALPARAISO, INDIANA



Instant changes of speed and feed. Operator simply resets position of two dials on I-T-E control box. Faulty shifting and risk of gear damage are eliminated because the gears are constantly meshed.

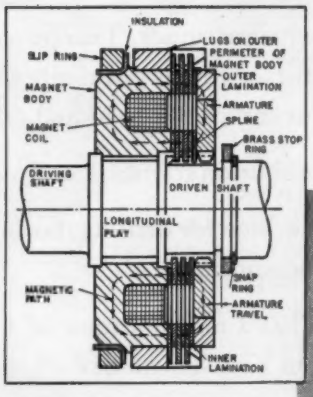
I-T-E ELECTRO CLUTCH. New power link permits rapid speed and feed changes—manual or automatic

Just by turning convenient hand dials controlling I-T-E Electro Clutches, a machine tool operator can change speed and feed rates accurately and with practically no effort or loss of production time.

Add automatic programming controls, and the machine makes these changes by itself, according to the predetermined schedule for maximum efficiency. The operator simply loads and unloads the machine.

I-T-E Electro Clutches are basically on-off coupling devices of high torque rating. They're unique in that they operate under oily conditions, and therefore are designed directly into the transmission box—saving space. They are so compact that in many cases they will fit into present transmissions and produce a greater number of speed changes without altering existing dimensions.

When you order new machine tools, insist on I-T-E Electro Clutches. There are over 70,000 already in use. Write for Bulletin 5306 for complete description. Dept. MA-3, I-T-E Circuit Breaker Company, Transformer and Rectifier Division, 19th & Hamilton Sts., Phila. 30, Pa.



Principle of operation

Alternate laminations key with perimeter lugs and splined shaft respectively. Rotate freely until magnet coil is energized. Magnetic flux compresses the laminations with great force, engaging clutch.

Typical arrangement

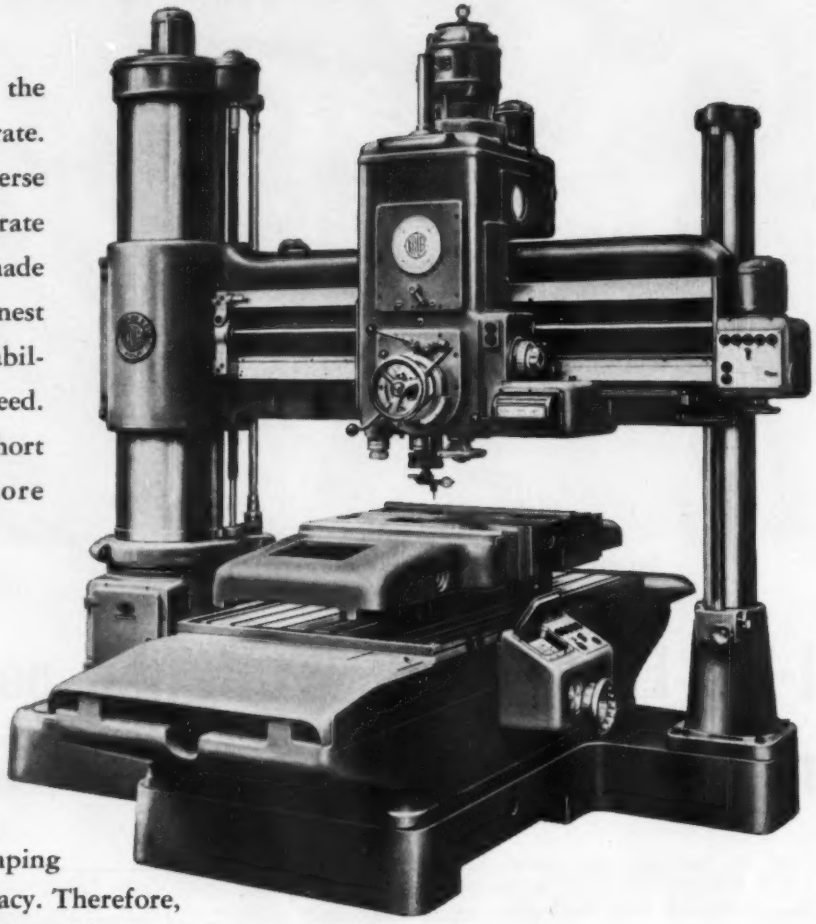
Milling machine gear layout using eight I-T-E Electro Clutches gives 16 speeds. Clutches are available in ratings from 1.8 to 7200 ft/lb starting torque and 3.2 to 13,000 ft/lb running torque.

I-T-E CIRCUIT BREAKER COMPANY Transformer and Rectifier Division

WITH A KOLB OPTICAL JIG BORER

YOU CAN POSITION A WORKPIECE TO WITHIN .000125″ IN A FEW SECONDS

Positioning a workpiece on the Kolb jig borer is fast and accurate. It's fast because of rapid traverse with adjustable stops—it's accurate because the optical system is made by Leitz, one of Germany's finest optical manufacturers. Repeatability of the coordinates is guaranteed. By eliminating costly jigs, short run jobs can be handled more profitably.



- Shock and distortion-free electro-hydraulic clamping does not impair accuracy. Therefore, reading accuracy equals positioning accuracy. Signal lights indicate if head and table are clamped or unclamped.
- Convenient pushbutton control—preselection of 18 feeds and 36 speeds.
- An excellent machine for drilling, boring, reaming, tapping and milling as well as precision measuring.
- Optical system has a magnification of 1:100—five inches on the focusing screen is equivalent to a movement of 0.05 inches along the coordinate.
- Working surface of table 69x39″, clearance between columns 73″, maximum distance between spindle and table 40″.

Write for more information.

COSA — *nationwide sales and service of precision machine tools —from bench lathes to boring mills.*

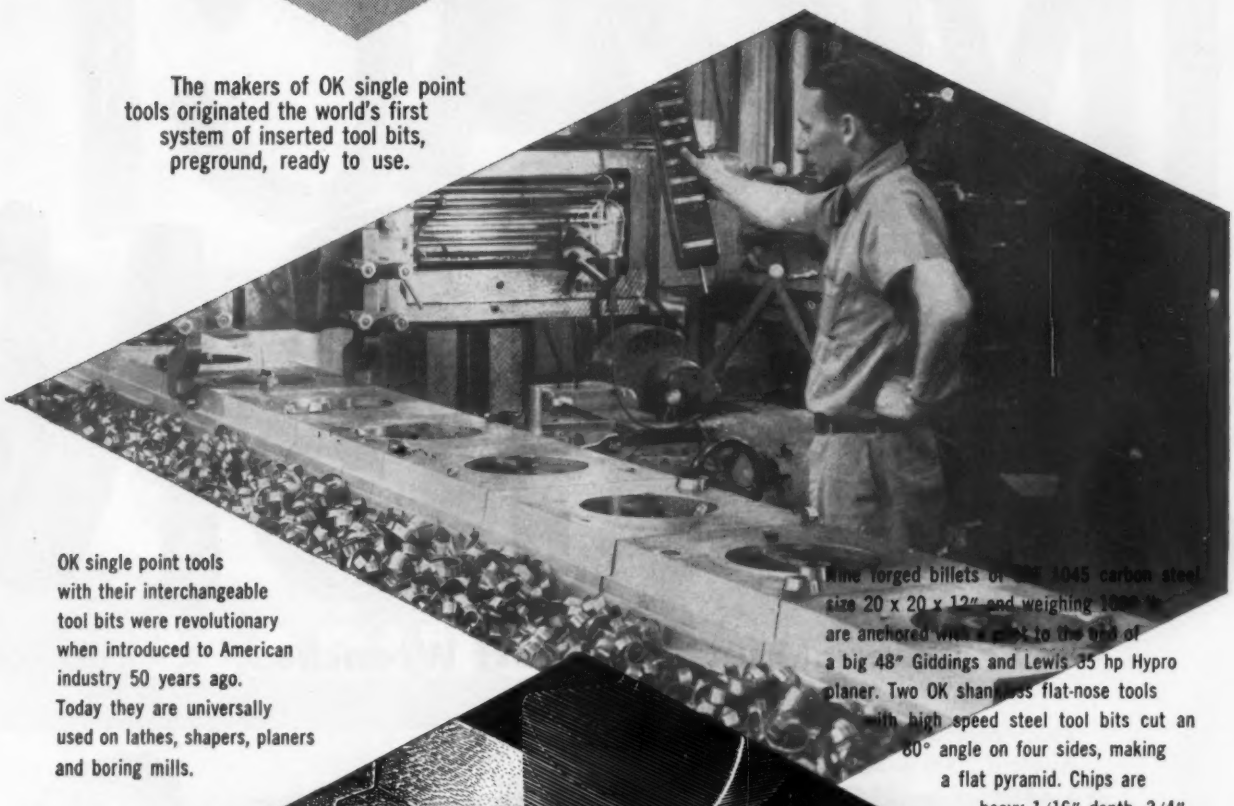
COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

How Bullard with two OK

Man-au-trol turret heads are gang-planed

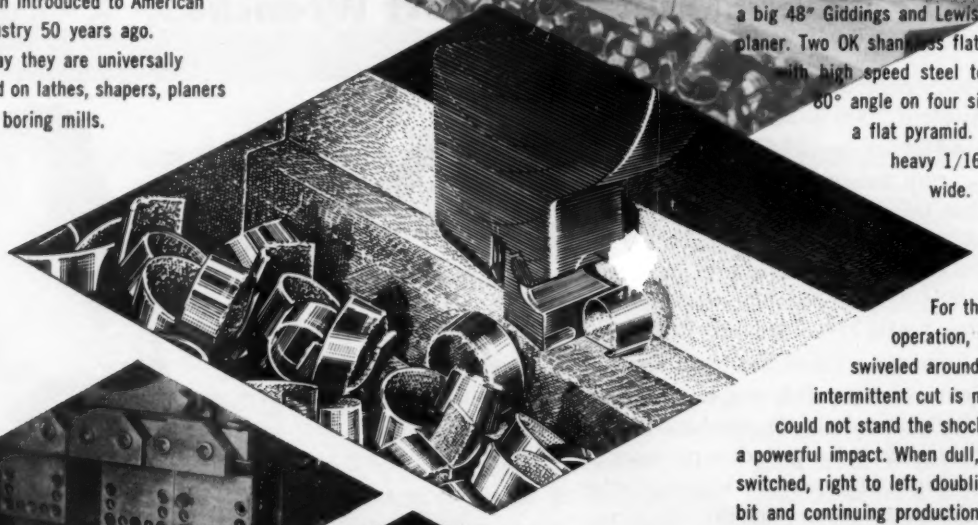
single point tools

The makers of OK single point tools originated the world's first system of inserted tool bits, preground, ready to use.



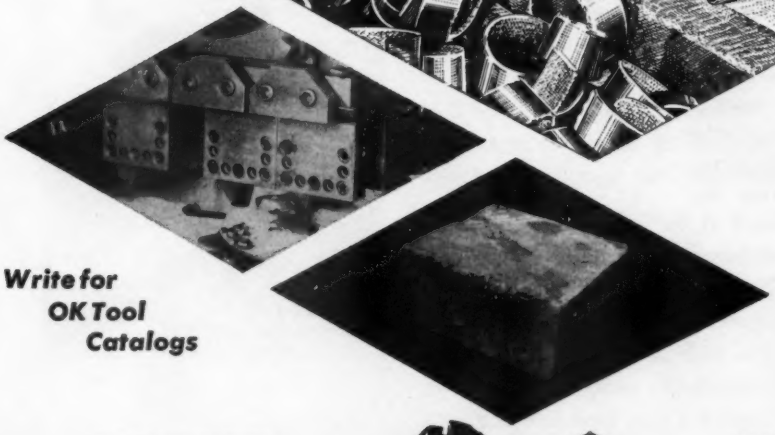
OK single point tools with their interchangeable tool bits were revolutionary when introduced to American industry 50 years ago. Today they are universally used on lathes, shapers, planers and boring mills.

Nine forged billets of SAE 1045 carbon steel size 20 x 20 x 12" and weighing 1000 lb are anchored with a gang to the bed of a big 48" Giddings and Lewis 35 hp Hypro planer. Two OK shankless flat-nose tools with high speed steel tool bits cut an 80° angle on four sides, making a flat pyramid. Chips are heavy 1/16" depth, 3/4" wide. Feed, 40 ft/m.



For the second operation, the blocks are swiveled around and a rugged intermittent cut is made. Carbide could not stand the shock of such a powerful impact. When dull, tool bits are switched, right to left, doubling to life of the bit and continuing production with the minimum of downtime.

OK tools are built for heavy machining. Holders are tough forgings. For tool bits, you have a choice of high speed steel, cobalt, Vasco Supreme and carbide.



Write for OK Tool Catalogs

TWO COMPONENTS— BODY AND BLADES

OK

modern milling cutters for modern milling machines

The OK TOOL COMPANY, INC., Milford, New Hampshire

you get more powerful

IMPACT ACTION

with CP Universal ***Electric Impact Wrenches***

That's right! CP's new Electric Impact Wrench develops 2000 powerful blows a minute! Its hard-hitting impact action gets more work done . . . runs nuts or screws faster and easier than ever before possible. And consider all these other design features that are "built-in" the CP-903R to afford tops in operating ease, safety, and dependability:

Slim Profile – the narrow, 2″ diameter nose permits easy access into tight spots.

Centered Pistol Grip and reverse switch in the handle afford simple one-hand operation.

Reverse Switch Interlock – prevents reversing while wrench is in operation.

"Unitized" Motor – resists vibration . . . assures long, trouble-free service life.

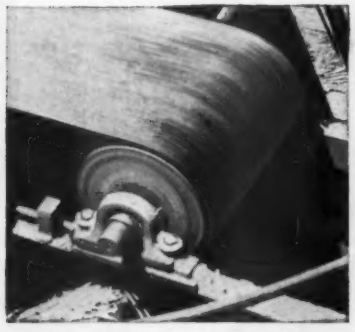
Bonus Capacity – while it's rated at ⅜″ bolt size capacity, the CP-903R has in most cases a bonus rating up to ⅝″ capacity.

Write for information.

Chicago Pneumatic *8 East 44th Street, New York 17, N. Y.*

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

A wonderful new Ball Bearing Pillow Block by Dodge . . . for *medium* duty!



More load-carrying capacity . . . larger shaft sizes . . . plus all the features and dependability of the famous S C Ball Bearing line! These are the qualities provided in Dodge S C M, a new line of mounted ball bearings, available in both pillow blocks and flange cartridge type.

Designed for medium duty, these new bearings are of heavier construction, with complete new housings. Metallic-backed Neoprene seals keep lubricant in, dust and dirt out of the bearing. Engineered to stay put, *the seal won't blow!*

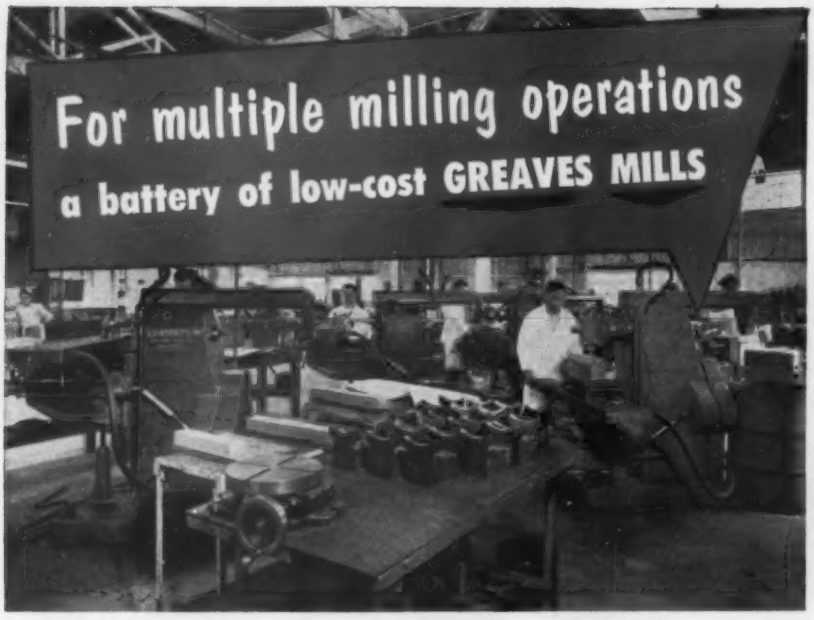
S C M bearings are new members of the famous Dodge 30,000 hour line, all of which are sealed, both on and off the shaft. Fully assembled and pre-lubricated at the factory, they are ready to slip on the shaft. Available from Distributors' stocks in shaft sizes from 1-7/16" to 3-7/16".

Write for bulletin with complete specifications.

DODGE MANUFACTURING CORPORATION
100 UNION ST., MISHAWAKA, INDIANA

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.



multiple mills speed production, save set-up time!

When you get 5 milling machines for the usual price of 2 or 3 . . . set up "production line milling" that's easily adapted to an extremely wide range of parts . . . you also get important savings! So reports an aircraft parts plant that installed 5 GREAVES MILLS, saved capital investment, production and set-up time!

With extra-size tables, 60" x 12" having 34" travel, GREAVES MILLS can be set up for fast, precise machining of larger parts requiring longer travel. Attachments include: dividing heads, vertical and universal milling, rack cutting, slotting, rotary table and others.

Write for Price and Performance Comparison Chart

GREAVES MACHINE TOOL CO.

2100 EASTERN AVE., CINCINNATI 2, OHIO

HOW TO APPLY METAL TO GLASS AND CERAMICS

is an *American Machinist* Special Report on recent developments in an important but not always well-known field of metalworking production.

Copies of this report are available at 15 cents each. Write to Reader Service Department, *American Machinist*, 330 W. 42nd Street, New York 36, N. Y.

McGRAW-HILL TECHNICAL WRITING SERVICE

TWS offers you a single INTEGRATED publishing service prepared to undertake a project from research and planning through finished manuscript and art, typesetting, mechanical preparation, printing and binding. Whatever the situation, whatever the type of literature you need, our editorial and art consultants can help you, bringing to your most specialized job the craft and skill of publishing experts.

WRITING EDITING ILLUSTRATING PRINTING

TO YOUR OWN OR GOVERNMENT SPECIFICATIONS

Whether you need an instruction book or service manual, to accompany your equipment, written to government specifications . . . . . or product catalogues or training booklets . . . or annual reports . . . or company histories . . . our writing staff can do the job for you, our artists can create and execute the illustrations. And McGraw-Hill printing, binding, and paper resources are among the best in the country.

SAVE MONEY AND TIME

LET OUR STAFF BE YOUR STAFF FOR TECHNICAL and BUSINESS PUBLICATIONS

ASK OUR REPRESENTATIVE TO CALL

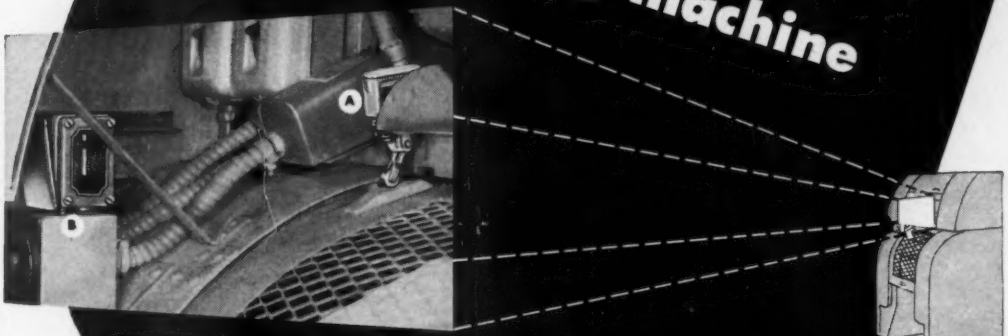
Write • Phone

Technical Writing Service
McGraw-Hill Book Co., Inc.
330 W. 42nd St., N. Y. 36, N. Y.
LOngacre 4-3000

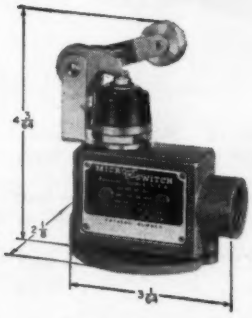
MICRO SWITCH Precision Switches

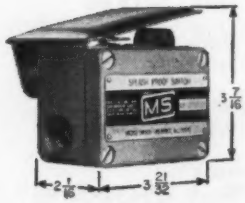
A PRINCIPLE OF GOOD DESIGN

How a plant superintendent added safety to a tumbling machine



A





B

● Here's a plant superintendent who doesn't have to worry any more about a tumbling machine operator opening the protective screen while the device is in operation.

The roller arm switch, which he installed near the top of the machine, is held actuated by the screen when it is in place. Moving the screen opens the motor circuit and stops the machine. The second switch is located under the hood and is hand operated. It enables the operator to "inch" the chambers into desired position for loading and unloading. Chambers turn only when switch is held depressed.

Such a safety device, provided by installation of MICRO SWITCH units, is but one of hundreds of ways plant engineers and maintenance men have found to make machinery safer, more automatic and more productive by the use of these versatile precision switches.

There is a MICRO SWITCH distributor near you. Look in the yellow pages of your phone book under "Switches, Electric." Ask for Catalog 101.

Do you read MICRO TIPS?
Ask to get on the mailing list. Learn how to use precision switches for greater profit.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • **FREEPORT, ILLINOIS**

H HONEYWELL

END MEASURING (LENGTH) RODS

Tolerance in millionths of an inch overall length.

1"	+ 8 — 0
2"	+16 — 0
3"	+20 —10
4"	+20 —10
5"	+20 —10
6"	+20 —10
10"	+30 —20
12"	+30 —20
15"	+40 —20
Micrometers	+25 —25

•

These End Measuring Rods are made from selected steel and are hardened, seasoned and lapped to the tolerances shown above.

•

Other sets can be had upon application and made to specifications requested.

A complete inspection and reconditioning service is maintained at our plant.

Rods and micrometer heads can be purchased individually or in sets.

Set No. 1 consists of two each 1", 2", 3", 4", 5", 6" and four 12" Measuring Rods with two 4" Micrometer Heads in a wood case. Price **$375.00**

Metric Set 1M consists of two each 25mm, 50mm, 75mm, 100mm, 125mm, 150mm and four 300mm Measuring Rods and two 100m heads in a wood case. Price **$375.00**

Set No. 2 consists of two each 1", 2", 3", 4", 5", 10" and one 15" Measuring Rod with two 4" Micrometer Heads in a wood case. Price **$345.00**

Set No. 3 consists of two each 1", 2", 3", 4", 5", 6" and five 12" Measuring Rods with two 4" Micrometer Heads in a wood case. Price **$415.00**

Set No. 4 consists of two each 1", 2", 3", 4", 5", 6" and eight 12" Measuring Rods with two 4" Micrometer Heads in a wood case. Price **$537.50**

Set No. 5 consists of two each 1", 2", 3", 4", 5", 6" and ten 12" Measuring Rods with two 4" Micrometer Heads in a wood case. Price **$615.00**

Set No. 6 consists of two each 1", 2", 3", 6" and one 12" Measuring Rod with two 4" Micrometer Heads in a wood case. Price **$245.00**

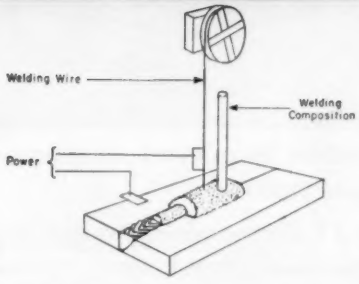
SWEDISH GAGE COMPANY OF AMERICA

10641 HAGGERTY • DEARBORN 1, MICHIGAN

C. E. JOHANSSON GAGE COMPANY, A DIVISION

DISTRIBUTOR OF JOHANSSON GAGE BLOCKS

UNIONMELT Welding Solves "Impossible" Casting Job . . .



UNIONMELT welding solved the problem when a manufacturer was unable to make one-piece castings of compressor cylinders used in gas line pumping stations—other welding methods proved too slow and costly . . . UNIONMELT welding cuts 40 hours in production time, and produces high-quality welds that easily withstand pressure of 750 lb. per sq. inch.

The 42-in. diameter cylinder is cast in two halves, and has an internal piston bore with surrounding suction and exhaust chambers . . . The 2½-in. thick piston walls and 3-in. thick outer walls of each half are aligned and UNIONMELT welded.

Like many other products throughout industry, these cylinders are being fabricated faster and more economically than ever before, because UNIONMELT welding offers:

- Higher welding currents than other welding processes . . . Up to 4,000 amperes . . . Joins metal of any thickness.
- Greater economy—½ to ⅔ less welding wire . . . Also uses larger-diameter, less-expensive wire.
- Use of any power supply—a.c., d.c., or constant potential . . . With c.p., no control is necessary to maintain constant arc voltage—welding is fast and more easily controlled.

Start saving now—call your local LINDE representative for more information and ask for Form 7942, "Modern Methods of Joining Metals."

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

The terms "Linde" and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

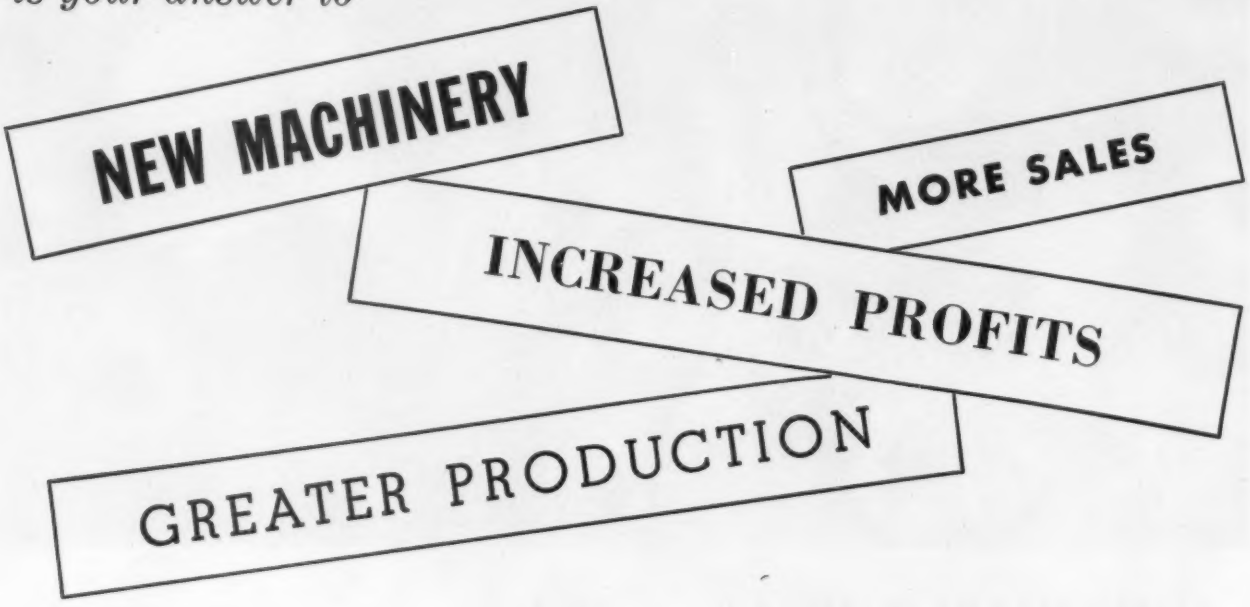
Linde Trade-Mark

PAYD* PLAN

and

SUM-OF-THE-DIGITS DEPRECIATION

is your answer to



Production planners cry for new machinery. Sales competition makes it vital. Equipment obsolescence threatens your profits.

C.I.T. Corporation's *Pay-As-You-Depreciate Plan helps you finance new machinery—satisfies your production people—meets your sales competition—increases your profits.

PAYD PLAN was built around the fastest permissible depreciation method: "Sum-of-the-Digits." It sets up installment payments which match your depreciation allowances as closely as possible. In effect you write off new equipment payments as expense.

Additional advantages: You make a minimum initial cash outlay. You enjoy long terms. You benefit by acquiring new profit-making equipment immediately.

PAYD PLAN is solving equipment purchase problems and making new profits possible in many industries. It covers such categories as machine tools, material handling equipment and construction equipment.

Terms range from six to ten years. The PAYD PLAN charge is 4.25% for each year of the term, computed on the original unpaid balance.

New PAYD PLAN folder describes how you can put new machinery to work right away. Just write, we'll send it without obligation.

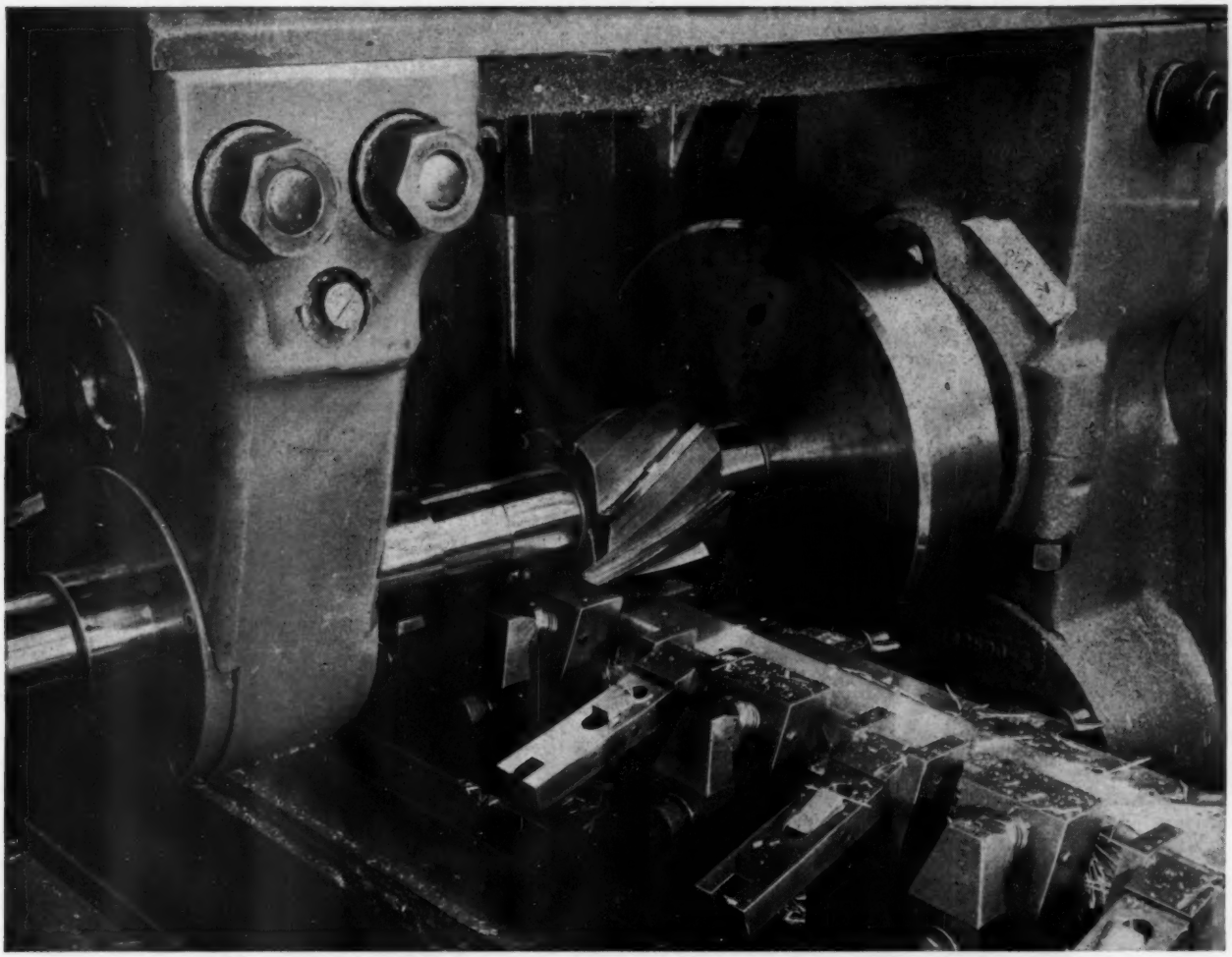
C.I.T. CORPORATION

The Wholly-owned Industrial Financing Subsidiary of C.I.T. Financial Corporation
Capital and Surplus over $200,000,000

DIVISIONAL OFFICES

Atlanta 66 Luckie Street, N.W. Cypress 8621	Cleveland 750 Leader Building Main 1-4824	Kansas City 210 West Tenth Street Baltimore 3551	Memphis 8 North Third Street Memphis 5-6795	Philadelphia 1530 Chestnut Street Rittenhouse 6-8180
Chicago 221 N. LaSalle Street Randolph 6-8580	Houston 1100 E. Holcombe Blvd. Lynchburg 3921	Los Angeles 416 W. 8th Street Michigan 9873	New York 390 Fourth Avenue Murray Hill 3-6400	Portland, Ore. Equitable Building Capitol 9721

San Francisco—660 Market Street—Yukon 6-5454



Grumman Tool Engineers report:

Cougar tail part milled five times faster with "Helicarb" Helical Carbide Slab Mills

Grumman Tool Engineers were quick to recognize the advantages of "Helicarb" Helical Carbide Milling Cutters. The faster speeds and feeds, better finishes, more parts per grind, and longer tool life possible with these new cutters have resulted in greatly increased production and lower costs.

For example, take the part shown under the cutter in the above photograph. It is a cap strip for the tail section of the F9F "Cougar," a speedy jet fighter manufactured for the U. S. Navy. Switching to "Helicarb" Helical Carbide Slab Mills enabled the table feed to be increased *five times*, reducing cycle time to only 1/5 of what it was previously.

Finishes of 20-25 r.m.s.

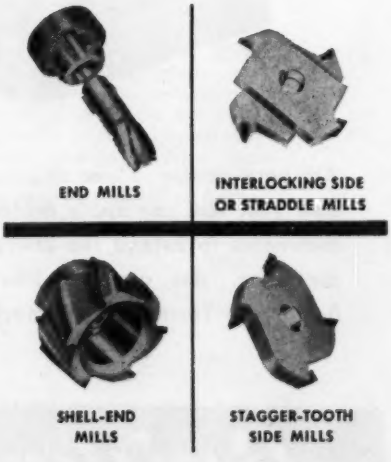
To get the best possible finish on the part, vibration was dampened by mounting a flywheel on the arbor. The combination of "Helicarb" cutter and flywheel produced a finish of 20-25 r.m.s., reducing hand work to a minimum and thus further lowering the cost of the part.

Amazingly efficient flute design

The secret of the "Helicarb" Cutter is its highly efficient tooth design. A true helical flute is combined with the edge hardness of a one-piece carbide tip. The result is a husky, heavy-duty cutter that is unmatched for heavy stock removal.

Available in variety of models

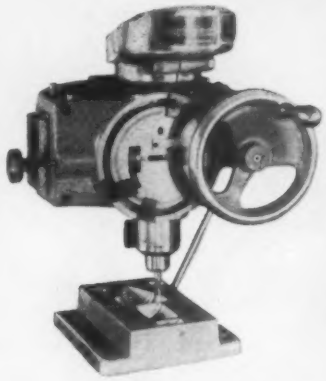
Helicarb Cutters are now available as standards in a variety of models and sizes for both non-ferrous and steel applications. A catalog giving full details is yours for the asking. Write to Sonnet Tool & Mfg. Co., 575 No. Prairie Avenue, Hawthorne, California.



HELICARB

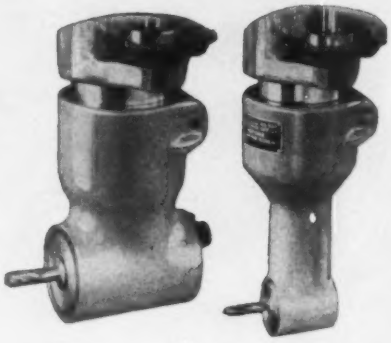
"Helicarb" Helical Carbide Milling Cutters

RIGHT ANGLE ATTACHMENTS

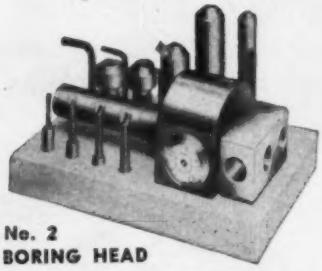


CHERRYING ATTACHMENT

Makes possible production of convex and concave shapes. Ideal for producing drop forge dies, molds, cavities.



(Left) Heavy Duty . . . for milling and drilling at right angles; fits both Master and 1 HP Bridgeport Heads. (Right) Light Duty . . . for right angle milling and drilling narrow, deep molds and cavities.



No. 2 BORING HEAD

Boring Tools and Holder provide means for boring holes up to 6" diameter; available for use on Bridgeport 1 HP Milling, Drilling and Boring Attachment.

MILLING MACHINE VISE

Improved and providing great gripping power, with large diameter screw for rigid holding. Streamlined for appearance and equipped with coolant trough. Two sizes: 5"x3½" and 6"x5" jaw openings.

A few of the Attachments available

Bridgeport

offers great versatility through its wide range of ATTACHMENTS

"Bridgeport Millers" in themselves are universally recognized as machines of outstanding utility. Their *exclusive method* of being able to drill, mill, bore and shape over a wide area without changing set up, has contributed much to their universal acceptance through the convenience, economy and accuracy offered. But this is not the whole story . . .

Note the attachments shown above. Here are a few means developed by "Bridgeport" engineers to go still further in extending the versatility of these machines . . . attachments which mean not only greater convenience but which vastly extend the operations which can be performed . . . attachments which will enable *one* machine to do the work of *several* single purpose machines. Furthermore, many more jobs can be assigned to the "Bridgeport" with the result that many more productive hours are available from *one* machine.

Ask your dealer . . . or us . . . to show how you, too, can apply Bridgeport Attachments to extend the utility of your machines. Ask also for literature on Bridgeport Turret Milling Machines.

Bridgeport MACHINES, INC.

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

BEARING PROBLEMS? ------Call on

NEW DEPARTURE

PDQ*!

*
PRICE

Feed-back principles are employed in this ball race form grinder at New Departure. The machine automatically adjusts to maintain specified tolerances. More perfect pieces per hour mean lower costs for the bearing user.

*
DELIVERY

Speed with precision extends to the shipping room. This New Departure wrapping machine seals bearings in protective paper automatically, untouched by human hands. You can count on New Departure to meet the demands of *your* delivery schedule.

*
QUALITY

Quality control is of prime importance in the high-volume, ultra-precision manufacture of ball bearings. Balls are automatically inspected by an electronic scanning device that operates with a speed and accuracy considered to be impossible a few years ago.

PLUS ENGINEERING SERVICE

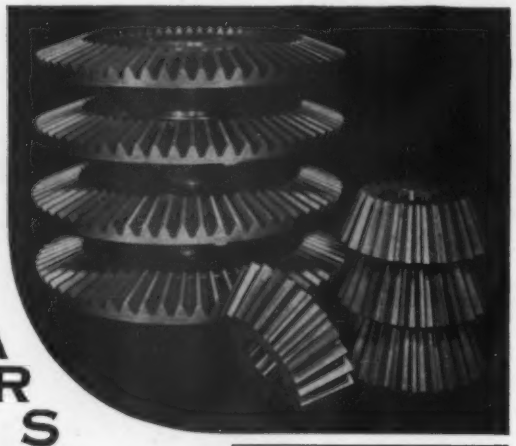
New Departure engineers are ready to help with your ball bearing problems. And when you consult with New Departure you get the benefit of more than 50 years' experience in ball bearing design and manufacture. Call, wire or write . . . New Departure can help you . . . PDQ!

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN.

NEW DEPARTURE
BALL BEARINGS

NOTHING ROLLS LIKE A BALL

BEVEL GEARS

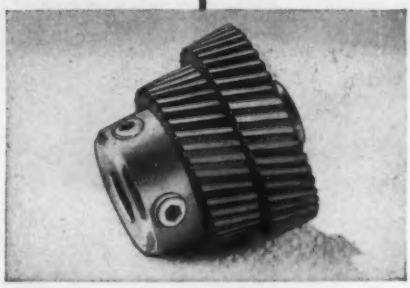


These four perfectly matched sets of steel bevel gears were built by Stahl to exacting Navy specifications for use on floating docks. Stahl's specialized experience and ample facilities are yours to command. For gears in any size—any quantity, precisely made and delivered on time—get your next estimate from Stahl!

SPURS TO 72" PD, 1 DP
BEVELS TO 54" PD, 1 DP
SPIRAL, HELICAL and WORM GEARS TO 48" PD, 2 DP
CONTINUOUS-TOOTH HERRINGBONE TO 60" PD, 2 DP
SPROCKETS TO 72" PD, 2½" CP
RACKS TO 20 FT. LONG, 3 DP
SILENT GEARS; RAWHIDE, BAKELITE, FIBROIL
HEAT-TREATED, CASE OR FLAME HARDENED GEARS — OF CARBON OR ALLOY STEEL

Stahl
GEAR & MACHINE COMPANY
3901 Hamilton Ave. Cleveland 14, Ohio

See How



NYLON GEARS

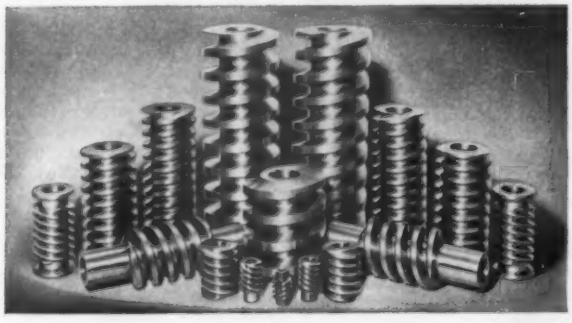
CAN SAVE UP TO 90% IN GEAR COSTS FOR YOU.

Nylon gears are quiet, durable, efficient and need less lubrication. Nylon gears can mate with metal gears where necessary. Our more than a decade of manufacturing fine pitch gears for some of the country's most particular users of precision and commercial gears makes us your logical source for Nylon gears. We can mold large quantities at savings up to 90% and we can cut smaller quantities from molded blanks at proportionate savings. Or we can produce experimental work cut from Nylon bars.

Let us show you how Nylon gears can be adapted to your use. Write today, sending full details for estimating purposes.

102

PG
PROCESS GEAR CO., INC.
4614 W. Fullerton Ave. • Chicago 39, Illinois



ADAMS custom made gears

While your product is still on the boards, plan on using Adams precision-made gears. Built by craftsmen . . . exactly as specified.

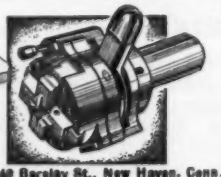
the ADAMS line . . .

SPUR GEARS
BEVEL AND MITER GEARS
WORMS AND WORM GEARS
SPROCKETS
INTERNAL GEARS (Spur and Helical)
RATCHETS
SPLINED SHAFTS
LEAD AND FEED SCREWS
SHAVED TOOTH GEARS (Spur and Helical)
GROUND THREAD WORMS
RACKS

The ADAMS Company
Dubuque, Iowa, U. S. A.
ESTABLISHED 1883
FINE GEARS MADE TO YOUR SPECIFICATIONS
GEARS

LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades
ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.
Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

H&C Insert Chaser DIE HEADS



famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.
THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Pacific Coast Representative: A. C. Behringer, 334 N. San Pedro St., Los Angeles, Calif. Canada: F. F. Barber Machinery Co., Toronto, Can.

BEVEL GEARS AND BEVEL PINIONS WITH LONG STEMS

ALL TYPE GEARS

BILGRAM
BILGRAM GEAR & MACHINE WORKS
1217-35 Spring Garden, Philadelphia, Pa.

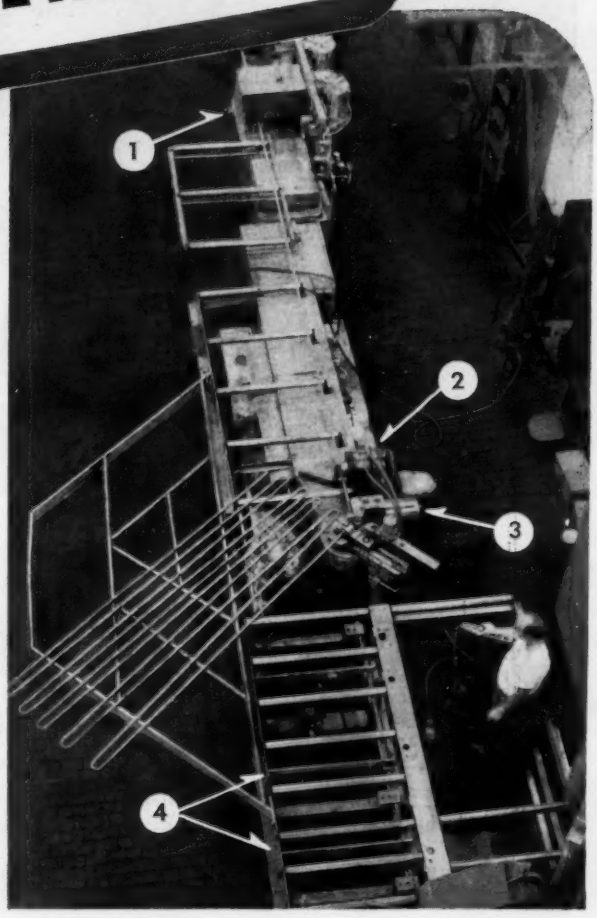
Automation IN COIL BENDING

How Serpentine Coils Are Now Produced in One Continuous Operation on PINES Size 1¼ Production Bender

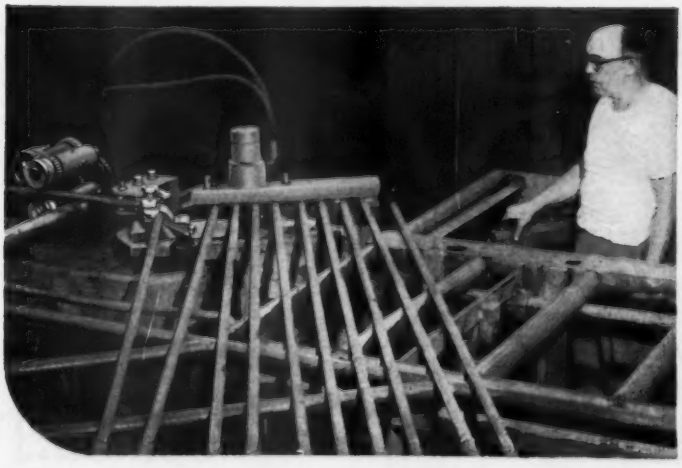
● At Carrier Corporation, Syracuse, N. Y., large serpentine air conditioning coils are now completely formed in one, continuous bending operation on a Pines Size 1¼ Production Bender equipped with a flash welder, automatic feed roll, and turn-over fixture. By former methods, three machines were required to meet production needs, and after bending, from 64 to 128 welds were necessary to fabricate a complete cooling unit. In addition to the slow, inconvenient welding procedure, a considerable amount of stock cutting and work handling was required.

COILS NOW PRODUCED AT 200 BENDS PER HOUR

Today, with the new Pines equipment, complete serpentine coils are now formed with little work handling. Straight lengths of stock are butt-welded together before bending which permits completing the coils in one, continuous operation. This method reduces the number of welds and stock cutting because long lengths of stock are used. Scrap losses are reduced as much as 80%, and since the entire operation is mechanized, work handling is substantially reduced. The result — complete coils are now produced on one machine with two operators at a production rate of 200 bends per hour.



▲ Over-all view of Pines installation at Carrier Corp., Syracuse. Handles standard pipe ranging from ¾" up to 1¼" sizes. The unit combines (1) welder, (2) feed roll, (3) bender, and (4) turn-over fixture.



◀ Closeup view showing automatic feed roll and tooling. Hinged clamp die with angular cam surface and mating plate permits clamping workpiece without interfering with formed coil. Long, horizontal clamp holds ends of coils to prevent distortion during sweep of bending arm.

WRITE FOR *Free* DATA SHEETS

For more information on latest developments in production bending, write for copies of "Pines News". Describes and illustrates how production bending is helping cut manufacturing costs on a wide variety of jobs.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery 672 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

NILSON 4-SLIDE TAKES A TOUGH ONE . . .

Mass production of body trim clips for a leading make automobile proved a complex forming problem. A. H. Nilson's 4-Slide (Model S-4-T) did the job, forming .025" x 3", 1065 C.R.A. steel at 54 strokes per minute! Accurate, fast, and automatic, Nilson 4-Slides keep pace with one of the nation's biggest industries.

THIS ONE WAS EASY . . .

A Nilson 4-Slide, Number 1, forms 150 drapery hooks per minute from 0.70 basic steel wire. Nilson 4-Slides form wire or ribbon stock from the coil. They straighten, feed, pierce, blank, swage, stamp or coin, cut and form in one, fast, automatic operation . . . accommodate wire up to .5" dia., in feeds to 32" max., and ribbon up to 3.5" wide. Press sections from 5 to 75 tons.

A. H. Nilson provides forming recommendations from detailed information without obligation. Send for catalog.

A.H. NILSON MACHINE COMPANY

1519 RAILROAD AVENUE, BRIDGEPORT 5, CONNECTICUT

Automatic Chain Making Machines : Staple Forming Machines : Wire and Stock Reels : Wire Straightening Equipment : Slide Feeds for Presses

Now! Take home MORE PAY...step into a better job!

These books give you the facts needed to become a MASTER MACHINIST

HIGH-PAYING machinists' jobs are waiting for men who can handle them. Here's a sound guide that helps YOU fit into any one of these jobs. It gives you the practical knowledge of machine shop work that enables you to handle all kinds of jobs efficiently. You'll face work with confidence . . . plan and carry it out with better results . . . you'll see advancements and better pay come your way.

Shops throughout the country use this library. It answers questions on methods . . . tells what you need to know about the operation and repair of all types and sizes of machines for the whole range of metal cutting, forming and finishing operations.

The Modernized AMERICAN MACHINISTS' LIBRARY

2987 pages, over 2900 illus. Scores of charts and tables

6 VOLUMES

1. Turning and Boring, 3rd Edition
2. Drilling and Surfacing Practice, 3rd Edition
3. Grinding Practice, 3rd Edition
4. Gear Cutting Practice, 3rd Edition
5. Punches and Dies, 4th Edition
6. Jigs and Fixtures, 5th Edition

HERE'S the gist of more machine shop experience than one man could amass in a lifetime of work . . . written by experts and made available in 6 compact volumes. You can check on your own methods, keep abreast of modern practices, solve problems right on the spot as they come up.

Guides You on All Types of Jobs. With this guide, no job is too hard or unusual. The AMERICAN MACHINISTS' LIBRARY is so clearly and thoroughly indexed that you find in a jiffy answers to whatever problems may arise. With charts, diagrams, and pictures you're shown where to look for trouble . . . the characteristics . . . how to repair it . . . and the steps to take in order to keep machines operating smoothly and at top efficiency.

What this Library gives you:—complete guide for everybody, from shop executive to apprentice interested in the operation of machines — descriptions of all important varieties of machines, both manual and automatic, and methods of operating them—essentials of selecting machines, setting up work, and handling operations in reaming, tapping, planning, shaping slotting milling and broaching etc. etc.

NO MONEY DOWN
EASY PAYMENTS
6 MONTHS TO PAY

SEE THESE BOOKS 10 DAYS FREE

McGraw-Hill Book Co., Inc., Dept. AM-3-14
330 W. 42 St., NYC 36

Send me the AMERICAN MACHINISTS' LIBRARY, 6 volumes, charges prepaid, for 10 days' examination. If I find the books satisfactory, I will send you $4.50 in 10 days and $7.00 a month until a total of $32.50 has been paid. Otherwise, I will return the books.

Name .....
Address .....
City ..... Zone..... State.....
Company .....
Position .....
For price and terms outside U.S. write McGraw-Hill Int'L, N.Y.C. AM-3-14

MBI

• greater production
• lower costs
• smaller investment

PRECISION DESIGNED AND BUILT TO MEET THE REQUIREMENTS OF THE AGE OF AUTOMATION

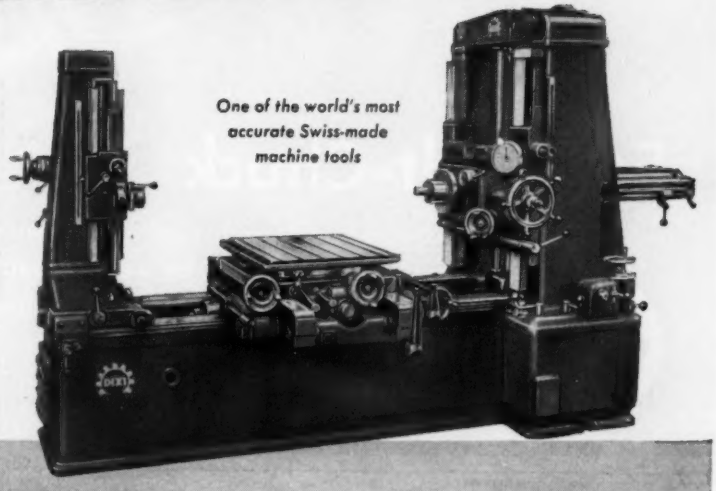
Dixi 60 Combination

Horizontal Boring Mill & Jig Borer

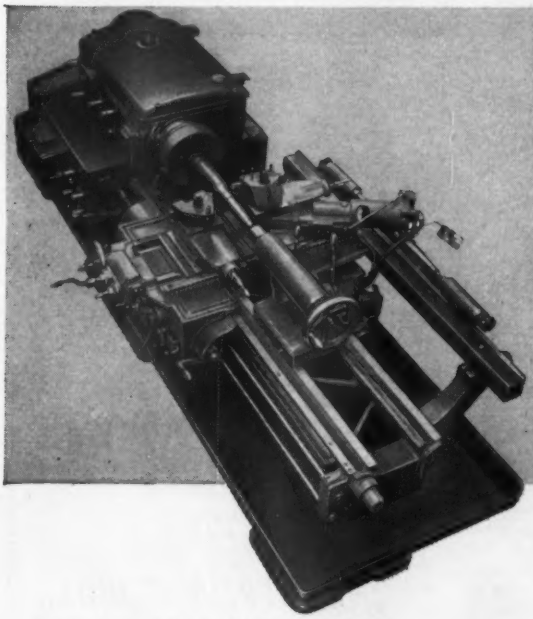
With 5 optical microscopes

A precision machine for boring, drilling, recessing, and milling work. Built-in rotary table with optical microscope can be rotated 360°. Headstock, column, and table settings by optical microscopes to insure overall accuracy of .0002". Table and spindle head have variable hydraulic feed. Mechanical spindle feed can be changed without stopping spindle and is provided with automatic depth stop.

No. 40 taper spindle. Spindle speeds 32-1350 R.P.M. Feeds .0015"—.010" per rev. Table size 28¾" x 32⅝" max. distance spindle to table 19¾". Table travel 23⅝". Spindle travel 24.4".



One of the world's most accurate Swiss-made machine tools



Heavy Duty Lathe *High Precision, Reliability, Top Performance Schaerer Model UN-450*

Twin cross slides. Copies from cylindrical or flat template either longitudinally or cross. Twin slides permit rough turning and finish turning in the same operation in many instances. Swings 17¾" over bed, 9" over carriage, 20-5/64" over gap. Center distance 60". Spindle speeds 31.5 to 1400 R.P.M.

Hydraulic copying attachment can be removed to permit use as a regular twin slide lathe when necessary. 10 H.P. motor drive to spindle. Separate motors for coolant and hydraulic pump. A production lathe built to tool room standards.

- *Guaranteed Service by Trained Staff*
- *Engineering Staff will make recommendations based on your requirements*
- *Spare parts in Stock*
- *Your Operators Trained*
- *Early Deliveries — Some from Stock*
- *Competitive Prices*
- *Financing and Rental Plans to Meet Your Requirements*

Many More Machines for Every Operation
Write for free illustrated brochure 100, or state your specific requirements

Write for complete details and prices to Dept. 21

M.B.I. EXPORT & IMPORT LTD.

A Division of Machinery Builders Inc.

475 Grand Concourse, Bronx 51, N. Y.

"Over 20 years experience in designing & building machinery"

CABLE ADDRESS: Machbuild New York
Phone: MOtt Haven 5-0900

See these & other machines in operation at

A.S.T.E. EXHIBITION — MARCH 14 to 18 — Shrine Auditorium, Los Angeles
WESTERN METALS EXHIBITION — MARCH 28 to APRIL 1 — Pan-Pacific Aud., L. A.

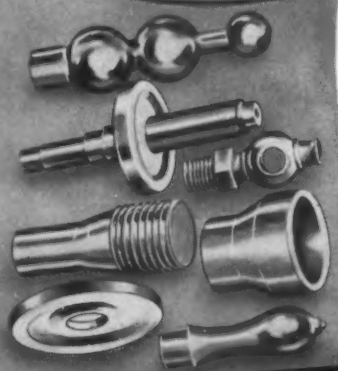
Forkardt-Chuck

No bevel wheels and spiral threads with their inherent deficiencies –
Transmission of power by wedge chain:
Highest gripping power – High resistance to wear –
Permanent gripping accuracy.
Paul Forkardt · Kommanditgesellschaft · Düsseldorf · Germany

Lehigh
TRACER-TOOL
PROFILE-TRACING LATHE ATTACHMENT

Proven in 101 practical shop and production applications!

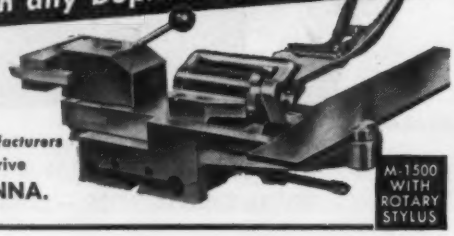
For Precision
DUPLICATING
With any LATHE, PLANER, BULLARD — with any type of tool



IT WILL PAY YOU TO INVESTIGATE THIS SIMPLE
LOW COST Heavy Duty Tool

Cuts duplicating time from hours to minutes. No complicated Hydraulic or Electronic controls. Requires no permanent lathe alterations. Uses easily made, low cost templates. Unlimited radii, threading, steps, facing, grinding, boring—on any metal. Models to fit lathes of all sizes.

Write for Catalog, Engineering Bulletins, and help on any Duplication Problem



M-1500 WITH ROTARY STYLUS

Air Control Division
Lehigh INC
— Engineers and Manufacturers
1501 Lehigh Drive
EASTON, PENNA.

Factory Trained Representatives at your service in all principal areas.

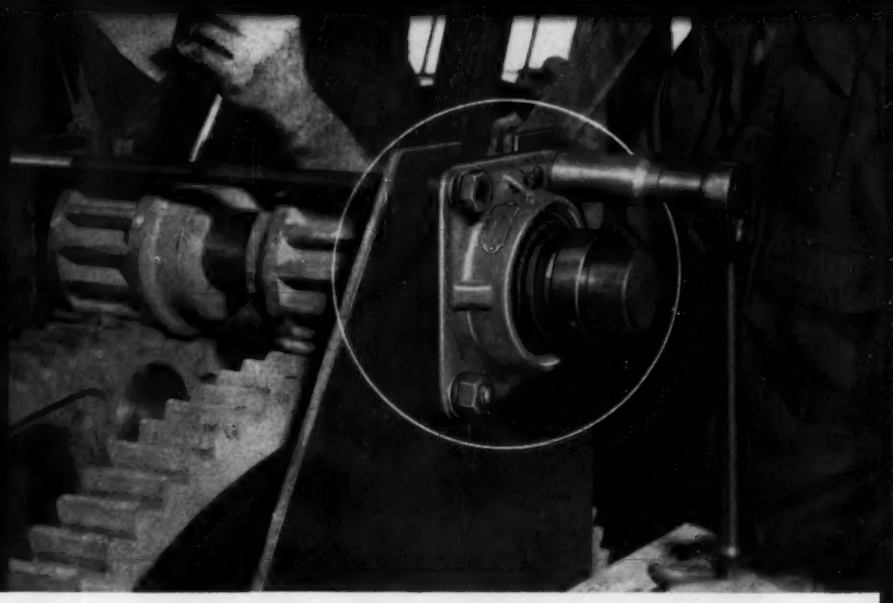
£4,000
NEW WAYS TO MAKE MONEY!
1955
HANNOVER GERMAN INDUSTRIES FAIR!
combines
CONSUMER and INDUSTRIAL GOODS!

At West Germany's Hannover Fair, APRIL 24-MAY 3, see more than 4,000 exhibits that include:

★ Pumps, compressors, fittings, valves, welding equipment, gears, drives, building machinery, hoists, conveyors, furnaces

★ Tools, abrasives, steel-treating machinery, and 3,884 more money-savers for your industry!

FREE fact-filled pamphlet!
Call Wisconsin 7-0727 today. Or write:
GERMAN-AMERICAN TRADE PROMOTION
350 Fifth Ave., New York 1, N. Y.



If assembly costs are lower

chances are

Fafnir has a bearing on it

Type LCJ Self-Aligning Ball Bearing Flange Cartridge equipped with Wide Inner Ring Mechani-Seal Bearing and Self-Locking Collar. For shaft diam.: ½" to 2 1/16".

The installation of a Fafnir Ball Bearing Flange Cartridge on the pinion shaft illustrated is being made with a socket wrench. No complicated blue prints, no costly machining, no time-consuming fitting and adjusting of bearing. Assembly costs have been cut without cutting corners.

The use of a completely-housed ball bearing unit is only part of this cost-cutting operation. The *Fafnir Unit* offers additional cost savings. Its bearing inner ring is bored for a slip fit. The eccentric cam design of its inner ring and collar makes locking action positive with a twist of the wrist. No lock nuts or adapters are needed. No adjustments of any kind are necessary. The bearing can't be cramped or overloaded when mounting.

If you are looking for a way to cut assembly costs, maybe Fafnir can help you through better, more economical use of bearings. The Fafnir Bearing Company, New Britain, Conn.

MOST COMPLETE LINE IN AMERICA

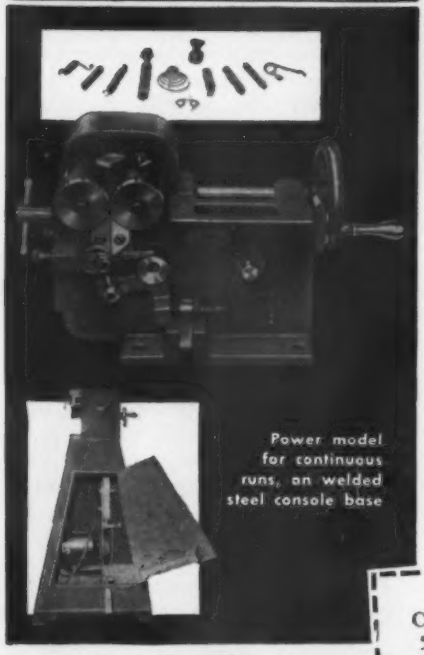
FAFNIR BALL BEARINGS

From the *American Machinist* Library of *Tips for Top Shop Men*

"QUEER DUCKS"—the men that don't fit the pattern—are also the men who don't think like the rest. They'll give you trouble, but they'll usually also give you ideas. Barnyard ducks conform readily to rules, but end up in a pot.

Hold any machine work at any EXACT angle with sturdy OMNI-VISE!

Accurately set in all three planes in only 15 seconds, this sturdy precision vise made in two capacities saves time and headaches for progressive shop operators and pays for itself quickly. Only 7" high (lowest in the trade), **OMNI-VISE** #4, shown at top, is tough, weighs 74 lbs. Jaws are 4" x 1½", open to 4". Base is 9" in diameter with one side straight. Inset shows **OMNI-VISE** #2, a precision low-priced vise. Users find it exceptional for grinding compound angles on carbide tools. Weight, 16 lbs. Height, 4¾". Jaws, 2⅛". Opening, 2⅛". Base, 7¼" x 5". For grinding, drilling or general work at any angle, by hand or machine, an **OMNI-VISE** is the machinist's choice.



Make any type spring, without arbors, FAST with Perkins Spring Coiler!

When you need a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005" to .125", you can produce it in a matter of seconds with the new Perkins Precision Spring Coiler! You entirely eliminate the use of arbors, yet turn out precision springs — torsion, compression, extension tapered, or special springs — coiled either left or right hand, in any desired length, any diameter from 1/16" to 12" and larger, with or without initial tension, and with open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications for replacements or experimental work. Make them fast right in your own shop!

EXCLUSIVE DISTRIBUTORS OF PRECISION MACHINE TOOLS

Connors and Davis Sales Corporation

CIRCUIT AVENUE, WEST SPRINGFIELD, MASS.

CONNORS AND DAVIS Sales Corp
503 Circuit Ave West Springfield, Mass.
Please send detailed information and prices on:
PERKINS SPRING COILER hand ☐ power ☐
OMNI-VISE #4 ☐ #2 ☐
Name_____Title_____
Company_____
Address_____
City_____State_____

Ideas for YOU in this report on Detroit's $1.1-billion investment in new tooling and automation

$1.1 billion, the largest such outlay ever, was made by automotive plants for new automated machines, tooling and setting up or rearranging lines for production of '55 cars.

Facts and figures on why and how this gigantic sum of money was spent . . . and who spent it where, are available to you in the timely 48-page report, "New Tools . . . Automated . . . Make '55 Cars." It's illustrated in detail with production flow-chart drawings and photos of actual installations in plants of PONTIAC . . . BUICK . . . CHRYSLER . . . AC SPARK PLUG . . . and SAGINAW STEERING GEAR.

All of the automatic methods discussed in the report are designed to boost production. Pontiac, for example, claims a 25% increase for its camshaft operations alone. Chances are that you can find many profitable ideas for your own production operations in this exclusive report on automation in the automotive industry.

Copies are available at 50¢ each from . . .

READER SERVICE DEPT.
American Machinist
McGRAW-HILL BUILDING
NEW YORK 36, N. Y.

double duty Nebel gap lathes

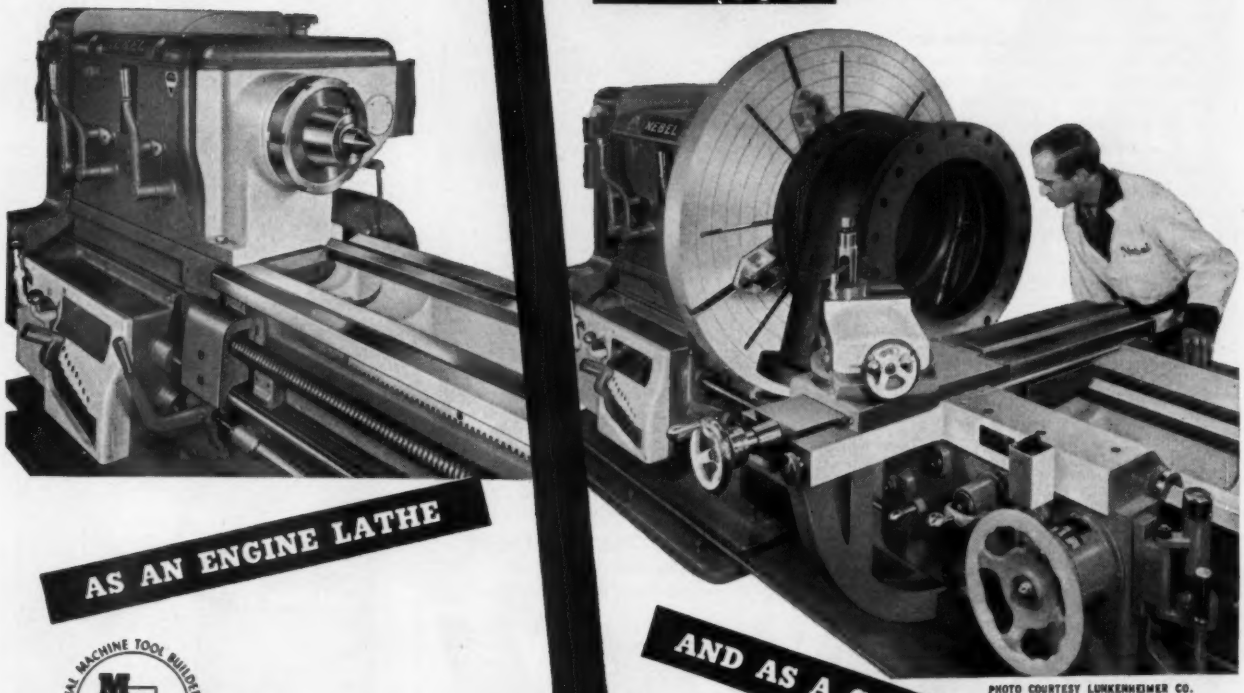


PHOTO COURTESY LUNKENHEIMER CO.

NATIONAL MACHINE TOOL BUILDERS' ASSN. MEMBERS OF

Nebel lathes meet U. S. government standards

for Army, Navy, Air Force and atomic energy projects . . .

and have been approved by industry since 1889.

This big Nebel extension bed gap lathe outperforms two standard lathes. Yet it requires the *floor space of just one lathe* . . . and you make *but one investment* for this doubly useful, dual purpose lathe.

Nebel gap lathes made in two extension bed gap models: 28″/50″ (illustrated) and 20″/40″. . . and in removable block gap models.

send for descriptive bulletins

★ **THE NEBEL MACHINE TOOL CO.**
CINCINNATI 25, OHIO, U.S.A.

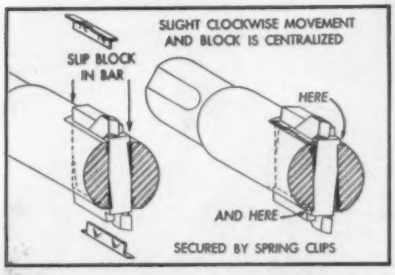
Quick-Change Boring Blocks for Roughing, Semi-Finishing, Reaming

These interchangeable blocks are quick inserting, self-centering, positive locking in the boring bar without locating holes or screws. Just slip the block into the slot of the bar and engage the projecting lugs to the ground flats on the bar. It is then perfectly centered. A pair of spring clips hold the block in place (see below).

The fully adjustable blades are preset to size. Standard blocks run 1¼" to 7¾" diameter, larger sizes are made to order. Blades are highspeed steel, cast alloy, or carbide tipped.

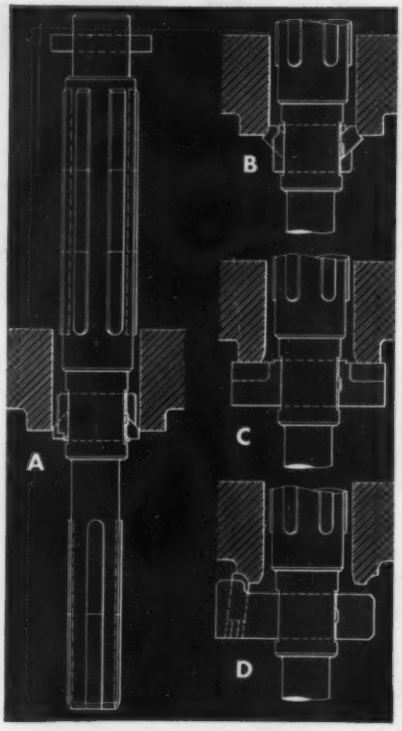
Bars, not weakened by locating holes, withstand the strain of heavy cutting. Ends of each slot are ground after hardening to take the cutting thrust of the blocks, provide rigid support.

The features of Gairing Boring Blocks have made many unique applications possible.



Unusual Production Job Made Possible by Quick-Change Feature

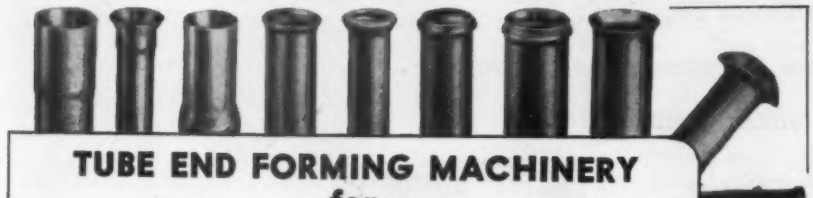
After forward stroke boring, using standard boring block (A), three other operations were performed alternately on the backward stroke of the spindle. Standard block with specially ground blades (B) and special blocks (C, D) use the same slot in the bar.



For full data on Standard Blocks and Bars, many more examples of production applications, see the Gairing Boring Tool Catalog. Write us, or call your local Gairing representative.

THE GAIRING TOOL COMPANY
Tooling—Standard and Special
21226 Hoover Road, Detroit 32, Mich.

COUNTERBORES - E-CON O-MILLS - BORING BLOCKS & BARS - FINE TOOTH CUTTERS - SPADE DRILLS - SPECIAL TOOLS - CHIP HOG TURNING TOOLS

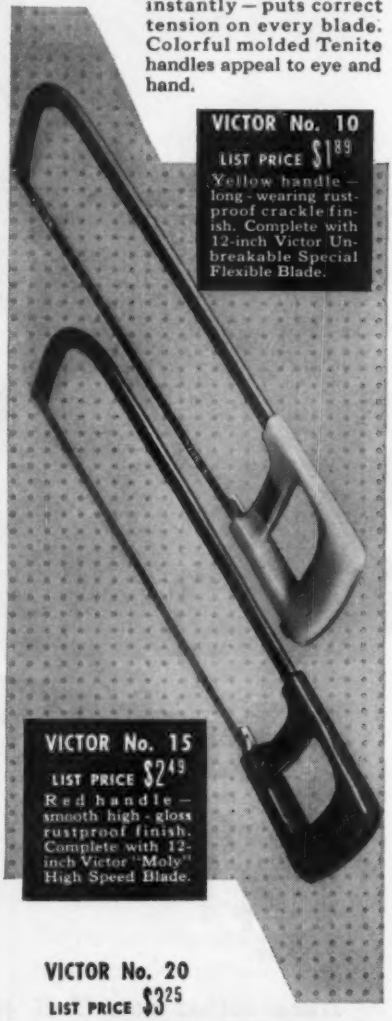


TUBE END FORMING MACHINERY
for
Beading—Flaring—Flanging—Expanding—Reducing —Sinking—Swaging—Grooving—Double Lap Flaring and Flanging ⅛" to 4½" TUBING
Write for General Bulletin G-3
VAILL *Engineering Company*
137 E. MAIN ST., Rear — WATERBURY 20, CONN.

2 new frames

COLORFUL FUNCTIONAL DESIGN

The new Victor No. 10 and No. 15 frames fit either 10-inch or 12-inch blades, yet are built around a solid, one-piece steel backbone, the most rigid construction ever devised. New under-the-handle lever-lock automatically — instantly — puts correct tension on every blade. Colorful molded Tenite handles appeal to eye and hand.



VICTOR No. 10
LIST PRICE $1.89
Yellow handle — long-wearing rustproof crackle finish. Complete with 12-inch Victor Unbreakable Special Flexible Blade.

VICTOR No. 15
LIST PRICE $2.49
Red handle — smooth high-gloss rustproof finish. Complete with 12-inch Victor "Moly" High Speed Blade.

VICTOR No. 20
LIST PRICE $3.25

Long-time mechanics' favorite. Adjustable for 10-inch or 12-inch blades. Extra-leverage tension lock.

Sold Only Through Recognized Distributors

VICTOR

SAW WORKS, INC. • MIDDLETOWN, N. Y., U.S.A.
Makers of Hand and Power Hack Saw Blades; Frames; Metal & Wood Cutting Band Saw Blades.

PORTAGE

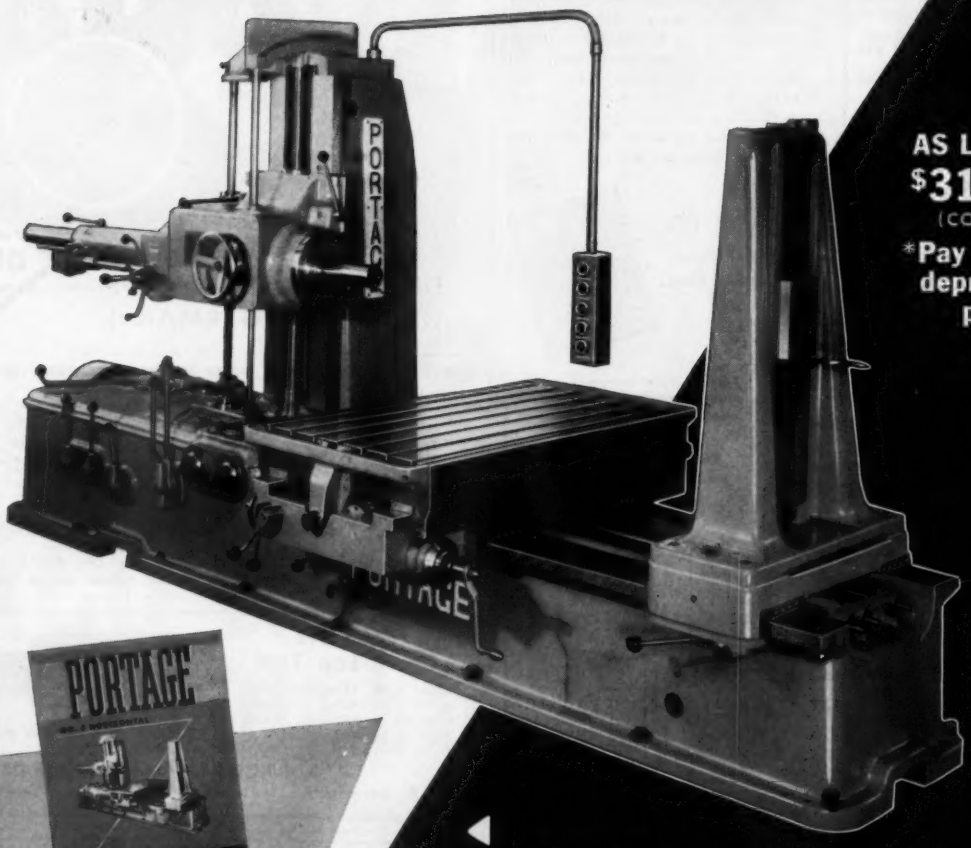
(4" Diameter Spindle)

Horizontal Boring, Drilling & Milling Machine

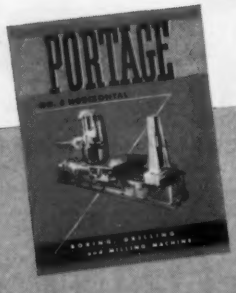
Outstanding . . .

MACHINE OF THE YEAR

Unsurpassed in Price and Quality



AS LOW AS
$31,358
(COMPLETE)
***Pay as you depreciate plan**



Write for Catalog today!

The PORTAGE Boring, Drilling & Milling Machine offers a *real* saving in new machine investment. PORTAGE mills cost from 5% to 20% *LESS* than present comparable makes . . . and the amazing part of this savings is the machine itself . . . Write today for literature covering all the specifications and features on the PORTAGE Mill.

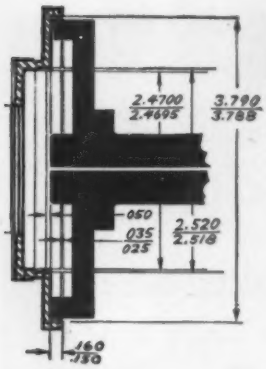
* For full particulars, phone the factory today!

THE PORTAGE MACHINE CO.

1026 Sweitzer Avenue • Akron 11, Ohio

Representatives in Principal Cities

BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1916



Gaging SHALLOW HOLES done easily to fractions of .0001"

COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from ⅛" to 8" dia.

UNIQUE ADVANTAGES

- Positive gaging accuracy to fraction of .0001" regardless of who operates it.
- Indicates actual size, a fixed—not passing—reading.
- Positive 2-point gaging—automatic centering.
- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
- Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes.
- Gages work while still held in chuck.
- A shop tool for all-day every day use.
- Portable — no wires, hoses or stands.

Investigate the gage used by the thousands in jet engine, guided missile, farm machinery, automotive transmission, household appliance, and other volume-precision plants. IT MAKES PRECISION GAGING EASY . . . at machine . . . at inspection bench . . . for selective assembly. No other like it—investigate and see why.

COMTOR CO.
68 Farwell Street
Waltham 54, Mass.

GET THE FACTS—REQUEST BULLETIN 48

DURIA HARD METAL

for Mining Tools
Cutting Tools
Drawing Die Industry
Wear Resistant Parts

The extraordinary fine and uniform grain structure of our Hard Metals guarantees longer tool life and high wear resistance.

DURIA

DURIA-WERK KARL KEMPF
NEUSS/RH. (GERMANY)

KEYSEATING
The Modern Way

Illustration shows typical set-up for cutting taper keyways with table tilted.

Machines are made in three sizes for keyways 1/16" to 1" in width.

Great simplicity and ease of operation of Davis Keyseater, assure the user of accurate, time saving work.
Let our engineer study your keyseating problems.

DAVIS KEYSEATER COMPANY
403 EXCHANGE ST. ROCHESTER, N. Y.

TOUGH STEEL STAMPS

WE KNOW THEY'RE TOUGH BECAUSE WE MAKE THEM THAT WAY.

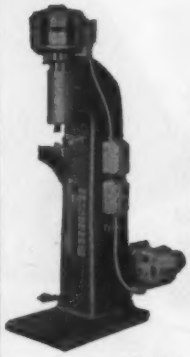
● This is the kind of Stamps your Tool Makers and Machinists keep under lock and key.

ACROMARK Company
7-13 MORRELL ST., ELIZABETH 4, N. J.

Abrasive Cen-R-Lap Tool

Saves time, eliminates diamond dressing. Cones changed in seconds. Available in 2 sizes, ⅜" and ¾" Cent-R-Laps and abrasive cones in leading grits. Write for descriptive literature and prices.

J. R. REICH MANUFACTURING CO.
45 E. Stroop Rd. Dayton 9, Ohio



GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types in clude Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

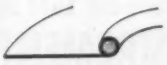
THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.

ERCO SHEET METAL FORMER AND FLANGER...

FLEXIBILITY that saves money...

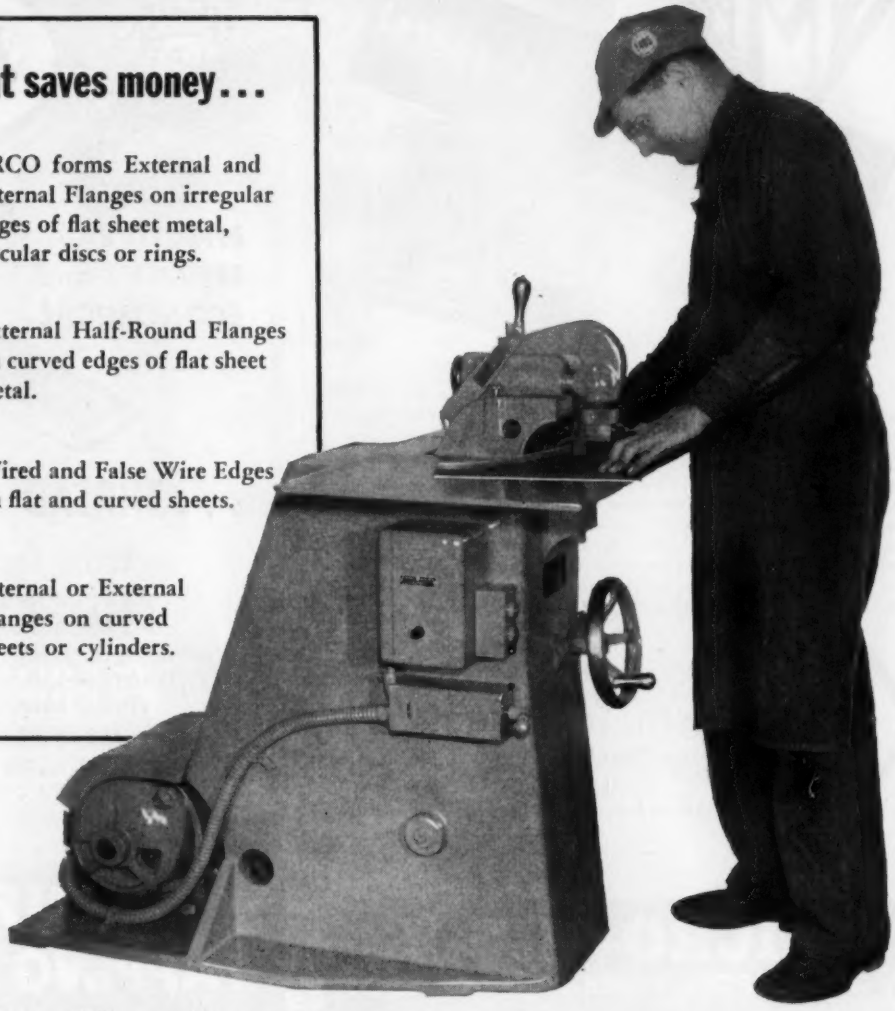
1. ERCO forms External and Internal Flanges on irregular edges of flat sheet metal, circular discs or rings.

2. External Half-Round Flanges on curved edges of flat sheet metal.



3. Wired and False Wire Edges on flat and curved sheets.

4. Internal or External Flanges on curved sheets or cylinders.



ERCO eliminates costly hand operations...

No longer must difficult forming and flanging operations be limited to costly, time consuming hand production or to expensive power press and die equipment. In a fraction of the time required to do the job by hand, the ERCO MODEL "HD" can form Plain, Return Bend, Flared, Large and Small Bend Radii, Half Round Flanges, and Wired or False Wire Edges on irregular curved and straight edges of sheet metal . . . also Outside and Inside Flanges on circular discs and rings, and on curved sheets or cylinders. Edges produced by the ERCO are smooth and well-formed. The ERCO will handle Soft, Semi-Hard or Stainless Steel, Soft or Semi-Soft Brass, Copper, Soft or Heat-Treated Aluminum Alloys and Monel Metal.

For complete information, send for illustrated Bulletin 158 today!

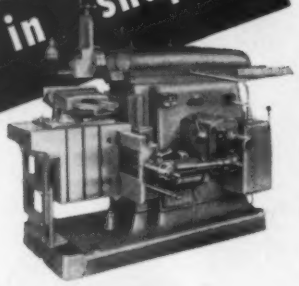
ENGINEERING and RESEARCH

A DIVISION OF acf INDUSTRIES INCORPORATED

RIVERDALE, MARYLAND

VMA

...the finest in shapers!



18", 22", 26"
Heavy Duty

Superb Swedish craftsmanship, plus fine design and construction backed by 50 years' experience, makes the VMA Shapers outstanding production and toolroom machines.

The standard and heavy duty models cover a range from 14 to 26" stroke length and are available optionally with swiveling or universal table, automatic tool post feed and automatic tool lifter. Table power rapid traverse and foolproof automatic pressure lubrication are standard on heavy duty models. Drive through anti-friction bearing transmission, hardened chrome nickel steel gears and double helical tooth crank gear are some of the quality features which contribute to VMA's stamina, dependability and smooth operation.

Prompt delivery — Attractive Price — Write for Folder!

austin industrial corp.

76-F MAMARONECK AVE., WHITE PLAINS, N. Y.

Dealers in principal cities

Look for the Austin Seal — your full guarantee of satisfaction!

EFFECTIVE
EFFICIENT and
ECONOMICAL

the Biggest
Advancement Ever in

. . . THREAD MEASUREMENT

Write for a ***FREE***

THREAD GAUGE

Without Obligation . . . TEST - TRY - KEEP

ACT TODAY! Include name and address of your regular industrial supply house.

METRONIC INSTITUTE
GAUGE DIVISION
Box 221 - Burbank, Calif.

MICRO-CHUCK

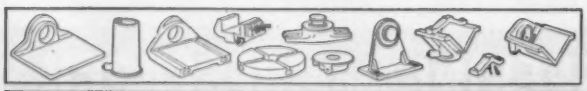
ALL-PURPOSE WORK-HOLDING TOOL

- SAVES TOOLING COSTS
- SAVES HOURS OF SET-UP TIME

MICRO-CHUCK illustrated with three jaw universal chuck. For precision off-center drilling, reaming or boring; for turning cams, or other eccentric work. Use on milling machines as offset boring head. MICRO-CHUCKS available to fit any machine of 9" swing or over.

Forget high-cost, time-consuming custom tooling for special machining jobs or new products—now MICRO-CHUCK offers a *universal* work-holding assembly that can be used time and time again for tooling up all different kinds of work such as castings, forgings, or odd-shaped parts. MICRO-CHUCK fits right on your present lathe; or use attachments on other machines such as drill presses, grinders, shapers, boring and milling machines. Work is brought quickly and securely to exact spindle center with two simple adjustments, or moved off-center up to 4 inches. Some of the many work-holding attachments available are shown below—so inexpensive they're expendable.

WRITE FOR FREE ILLUSTRATED FOLDER AND PRICE LIST NO. 206



MICRO-CHUCK

Division, SCOTT-BROWNE CORP.

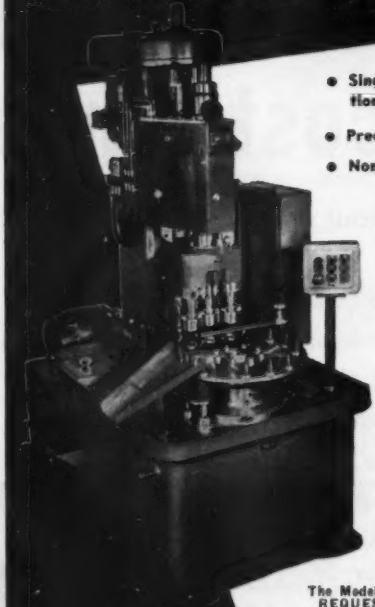
Batavia Pike • Newtown, Ohio

In Greater Cincinnati, The Machine Tool Center of The World

KAUFMAN

TAPPING MACHINES

BUILT FOR SPECIFIC PRODUCTION JOBS



- Single or Multiple Operations
- Precision Depth Control
- Non-reversing Motor Drives
- Pressure Lubricated Lead Screws
- Fast, Accurate Rugged Index
- Other Head Units Available
- And Many Other, Worthwhile Features

Send prints and sample of your work for further information and recommendations on how Kaufman Tapping Machines can reduce your production costs.

Catalogs Number 754 and 1153

The Model 75-24 MAILED ON REQUEST Kaufman Tapper

KAUFMAN

KAUFMAN MANUFACTURING CO.
543 So. 29th St., Manitowoc, Wisc.

Nichols TOOL ROOM MILLER

Accurate

Sensitive

Versatile

A compact, rugged miller that gives the tool room what it demands—extreme accuracy and utmost flexibility. The NICHOLS TOOL ROOM MILLER is arranged for sensitive hand screw feed. It has generous table surface of 8½" x 30", with 19" longitudinal travel. Precision feed screws are fitted with oversize, easy-reading micrometer dials. Large hand wheels provide the element of "feel" so important in precision milling. Rise-and-fall spindle enables easy handling of many difficult operations—increases usefulness—simplifies set-ups. Readily available are dividing head, vertical attachments, vises, and a full line of milling accessories. Priced surprisingly low. Descriptive literature sent on request.

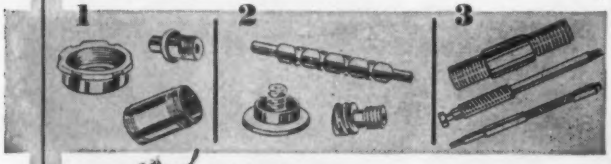
MANUFACTURED BY **W. H. NICHOLS COMPANY, WALTHAM, MASSACHUSETTS**

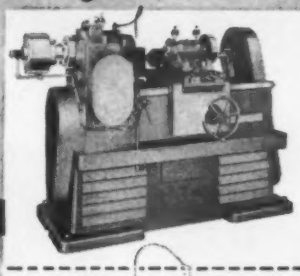
NATIONAL DISTRIBUTORS

NICHOLS-MORRIS CORPORATION

CUT PRECISION THREADS FASTER *with these 3* COULTER AUTOMATICS!

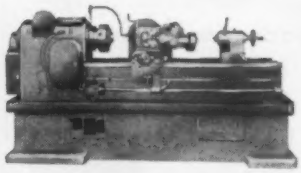
Whenever you use a Coulter, you'll see production figures skyrocket . . . production costs plummet. Try any one of these Coulter Automatic Threading Machines — and you'll want all three:





1 "H1" Hob Thread Milling Machine cuts precision, internal and external threads . . . AUTOMATICALLY.

2 "L1" Threading Lathe cuts precision, square, standard and 29 degree threads... AUTOMATICALLY.



3 "Threadmaster" Thread Milling Machine cuts precision, long and short traversing, elevating, cross feed and lead screws ... AUTOMATICALLY.

Without obligation, consult our engineering staff with your specific threading problems. Catalog and machine specifications available upon request.

MACHINE TOOL BUILDERS SINCE 1896

The James Coulter Machine Co.

635 Railroad Ave. Bridgeport 5, Conn.

A New Concept in Optical Comparator Design...

new WILDER small parts Comparator model C

- *Vertical Design*
- *Erect Image*
- *Eye Level Screen*
- *Horizontal Stage*

An Entirely New Model Optical Comparator Designed for 100% Production Inspection
ACCURATE - FAST - INEXPENSIVE
Promotes Inspection Economy

If you manufacture mass produced parts that are now being inspected or should be inspected on an Optical Comparator, the new Small Parts Comparator will enable you to inspect them quickly, accurately and economically at a surprisingly low per-piece inspection cost.

Write for Illustrated Folder—Code GINZE

Geo. SCHERR OPTICAL TOOLS, Inc.

200 AM LAFAYETTE STREET • NEW YORK 12, N.Y.

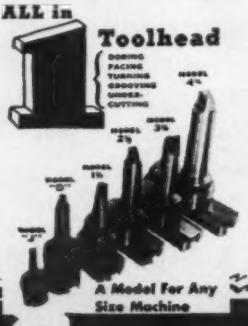
NOW *a better product made* BETTER

WITH THESE ADDED NEW FEATURES:

1 ADJUSTABLE TAKE-UP TO ELIMINATE END-PLAY IN FEED SCREW ASSEMBLY. BACK-LASH CAN BE TAKEN UP INSTANTLY

2 AND — TALK ABOUT LARGE OFFSET! OUR SMALLEST MODEL HAS ¾ IN. OFFSET AND OUR LARGEST MODEL HAS 4½ IN. OFFSET.

ALL in Toolhead



A Model For Any Size Machine

PLUS- POWER FEED for FACING and GROOVING

Think THAT Over!

WRITE for our New Catalog with complete information and prices!

CHANDLER TOOL CO.
Muncie, Indiana, U. S. A.

A Boring Head That Won't Face is NOT Complete

Chandler-Duplex

COMBINED BORING AND FACING TOOLHEADS

meet the family of

Hoffman Engineered Industrial Products

Each year more and more of the nation's industries place their confidence in products engineered and manufactured by U.S. Hoffman.

AIR APPLIANCE DIVISION

Centrifugal Blowers and Exhausters
Pneumatic Conveying Equipment
Industrial Vacuum Cleaning Systems
Continuous Metal Strip Driers
"Smoothflow" Tubular Pipe and Fittings

INDUSTRIAL FILTRATION DIVISION

Machine Tool Coolant Clarifiers—Flotation, Mechanical and Magnetic
Lubricating and Insulating Oil Conditioners, Filters and Vaporizers
Solvent Recovery Systems—Vacuum Stills and Filters

HYGRADE METAL FINISHING DIVISION

Mechanized Metal Cleaning and Phosphatizing Systems
Chemical Plating Equipment
Electrostatic Spray Painting Equipment
Paint Booths and Bake Ovens
Filters for Phosphate and Plating Solutions
Systems for Elimination of Stream Pollution
Pressure Vessels and Weldments for Process Industry

ORDNANCE EQUIPMENT DIVISION

Pneumatic Conveying Systems
High Efficiency Centrifugal Separators
Stationary and Portable Vacuum Cleaning Equipment
Process Equipment
Pneumatic Systems for Radioactive Materials

Keep your eye on the forward march at Hoffman. Let us make your problems our responsibility.

INDUSTRIAL DIVISIONS

U.S. HOFFMAN MACHINERY CORPORATION

DEPT. A.M. 105 FOURTH AVENUE, NEW YORK 3, N. Y.

If disaster strikes, everybody will want help at once

Imagine they just dropped an atom bomb.
(And maybe they will tomorrow. Who knows?)
You pick yourself up. You're unhurt.
Must have gone off some distance away.
Lucky that flying glass didn't get you.
Several fires out there in the plant.
Lots of casualties, too. Better get going.
Reach for the phone. It's dead. Well, you might have known.
Ambulances, fire engines, doctors, that's what you need.
And quick.
You've never needed help like you need it now.
But the same goes for everyone else in town.
Thank God Jones made all those people go to the first-aid classes.
Looks like they'll be the only help you'll get for hours.
Thank God they've got plenty of dressings, splints and stuff.
Remember when you got sore at Jones?
("All this stupid first-aid malarkey," you called it.)
Know better now, don't you?
Place looks like a tornado hit it.
Maybe that's what it was?
Whatever it was, better get busy.
There's plenty to do. Thank God you were ready.

Whatever the emergency is—you can be ready for it. That's just good business. Take these precautions TODAY.

- ☐ **Enlist the help** of your local Civil Defense Director.
- ☐ **Check contents** and locations of first-aid kits.
- ☐ **Send staff** to Red Cross courses. They may save your life.
- ☐ **Promote preparedness** in your community. Your local CD Director can show you how.

Check off these four simple points NOW—it's a matter of life or death.

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE

$1.50 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

BOX NUMBERS count 1 line additional.

POSITION WANTED undisplayed rate is one-half of above, payable in advance.

PROPOSALS $1.50 a line an insertion.

INFORMATION

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

EQUIPMENT WANTED OF FOR SALE Advertisements acceptable only in Displayed Style.

DISPLAYED RATE

The advertising rate is $12.60 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns —30 inches to a page. A. M.

NEW ADVERTISEMENTS Address N.Y. Office, 330 W. 42 St., N.Y., for March 28th issue closing March 14th

Useful for Design, Shop & Inspection Work

MACHINE TOOL RECONDITIONING & the Art of Hand Scraping

Write for folder describing illustrated book

MACHINE TOOL PUBLICATIONS

215 Commerce Bldg., Fourth & Wabash Sts.
St. Paul 1, Minn.

MACHINE TOOL BROKER

EXCLUSIVE AND DEPENDABLE SERVICE

MACHINE TOOLS

28 Years' Experience

JULIUS J. SCHNEIR & CO., INC.
103 N. Desplaines St., Chicago 6, Ill.

PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them

GENERAL PATTERN WORKS
7233 Buck Street Cincinnati, Ohio

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42 St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITION VACANT

MECHANICAL ENGINEER, must be graduate M.E. or E.E., with good background of experience in stamping and light assembly. Must have ability to sell your ideas to subordinates. Midwest town of 35,000. Small but growing company presently employing 300. Substantial salary depending upon experience. P-5764, American Machinist.

EMPLOYMENT SERVICE

SALARIED POSITIONS, $5,000 to $35,000. We offer the original personal employment service (established 45 years). Procedure of highest ethical standard is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. R. W. Bixby, Inc., 652 Brisbane Bldg., Buffalo 3, N. Y.

2 MACH. SHOP FOREMEN

START ABOUT $600

Middle West plant. One dept. Light Precision machining—other, medium to heavy castings. Company buying new plants—further opportunity.

RAY EDWARDS & ASSOCIATES
28 E. Jackson—Webster 9-2905—Chicago

SALES ASSOCIATE

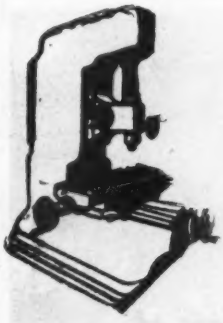
California Representative for lucrative national tooling lines plans retirement and seeks right party party to gradually take over business, on long term payment basis. Must be a Salesman.

BO-5639, AMERICAN MACHINIST
1111 Wilshire Blvd., Los Angeles 17, Calif.

PEACOCK CORPORATION

Propane Gas Installations
and
Anhydrous Ammonia Plants

Paul E. Peacock, Jr., Pres.
Box 268 Westfield, N. J. Westfield 2-6258



SEARCHLIGHT EQUIPMENT SPOTTING SERVICE

This service is aimed at helping you, the reader of AMERICAN MACHINIST, locate used and surplus new metalworking machinery and equipment not currently advertised. (This service is for user-buyers only.)

First, read the dealer ads on the following pages. A 5-minute study may locate the equipment now.

Second, send in the specifications of the equipment wanted on the coupon below, or on your own company letterhead, to

SEARCHLIGHT EQUIPMENT SPOTTING SERVICE
c/o American Machinist, 330 W. 42nd St., N.Y. 36, N.Y.

Your requirements will be brought promptly to the attention of the used equipment dealers advertising in this issue. You will receive replies directly from them.

NO CHARGE • NO OBLIGATION

SEARCHLIGHT EQUIPMENT SPOTTING SERVICE, c/o American Machinist, 330 W. 42nd St., New York 36, N. Y.

Please help us locate the following used equipment:

.....

.....

NAME ..... TITLE ..... COMPANY .....

STREET ..... CITY ..... ZONE ..... STATE .....

3/14/55

BUY FROM STOCK
Telephone
BAKER 5887

FALK
MACHINERY COMPANY

10 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented

LATHES

27"x18' MONARCH "N" Geared Head Lathe, 11' centers, Taper Attach., Full Equipment, Late Type, 1942.

18"x10' MONARCH "BB" Grd. Hd. Lathe, 72" centers, Taper Attach., Flame Hardened Bed, Late Type.

24", 36", 42" BULLARD Vertical Turret Lathes, New Era, Turret Hd., Side Hd. M.D.

1A WARNER & SWASEY Turret Lathe, Heavy Duty, Power Chuck Wrench, Timken Bearing.

No. 2, 4, 5 WARNER & SWASEY Geared Head Turret Lathes, Bar Feed.

24"x10' AXELSON Geared Hd., H.D. Model "E" 28" Actual Swing, M.D., Taper Attach. 1942.

No. 7 BARDONS & OLIVER Universal Turret Lathe, 2½" capacity. Preselector Head.

MILLING MACHINES

No. 2-18 CINCINNATI Plain Auto. M.D., Late

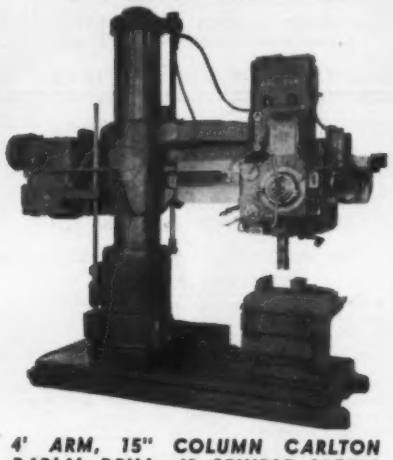
No. 2 BROWN & SHARPE Vert. Mill, Light Type, Swivel Head, M.D., Late.

No. 1-8 KENTS OWENS Hydraulic Horiz. Mill, Late Type, M.D.

6' arm x 17" column FOSDICK Economax Hydraulic Radial Drill, Motor on arm, late type.

6' arm x 19" col. CARLTON Radial Drill, 20 HP., late type.

DRILLING MACHINES



4' ARM, 15" COLUMN CARLTON RADIAL DRILL. 48 SPINDLE SPEEDS 15-1500 RPM. MOTOR ON ARM. 1943.

No. 262 BARNES Motor Driven Sliding Drill Press, 2" cap. in steel, 1941.

No. 2 M. T. Six Spindle ALLEN Type KH Drill Press, Individual Motor Drive, Late Type. 1943.

400 tons CHAMBERSBURG Hydraulic Wheel Press, 14" Ram, 96" between Tie Bars, 12' to End Support. M.D.

No. 0, 1, 2 BUFFALO FORGE Vertical Angle Bending Rolls, M.D.

#21½ BLISS O.B.I. Press, 56 tons cap., M.D.

No. 6 FEDERAL O.B.I. Press, 65 tons, cap., single geared, 4" stroke, M.D.

½, 1½ BUFFALO FORGE Universal Ironworker, Notcher and Coper, M.D.

T-56 VERSON Power Press Brake, 8' overall, late type, 100 tons cap., 1942.

No. 20 WATERBURY FARREL Thread Roller, ⅜" cap. 1944, Motor Driven.

No. 8LS FELLOWS M.D. Gear Lapping Machine. With Detachable Head, Universal Work Support.

No. 00G BROWN & SHARPE High Speed Automatic Screw Machine, Motor Driven. Late type.

10"x10" RACINE #30-C Hydraulic Heavy Duty Shear Cut Power Hack Saw, 1946.

10' x 10 ga., 10' x ¼" WYSONG & MILES Power Squaring Shears, Motor Driven.

GRINDERS

6" x 18" LANDIS Type "C" M.D. Hyd. Cylindrical Grinder, Serial #29196.

6" x 18" NORTON Vertical Hydraulic Surface Grinder, complete with mangetic chucks, coolant systems, late.

28" ROCKFORD Hy-Draulic Shaper, Vise, Late.

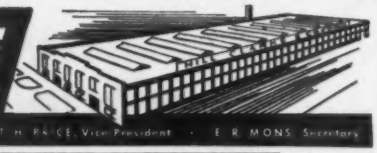
#TG615 JONES & LAMSON Thread Grinder, Lathe, M.D. and TG848.

No. 208 BESLEY Motor Driven Disc Grinder, 26" wheels, Late Type.

No. 194 BARNES Vertical Hone, 4" capacity, 12" stroke, Motor Driven.

OVER 1000 MACHINE TOOLS AVAILABLE IN STOCK . . . SEND US YOUR INQUIRIES

HILL-CLARKE
MACHINERY COMPANY



T. H. PRICE, Vice President · E. R. MONS, Secretary

CONSULT US ABOUT REBUILDING YOUR OWN MACHINES

BORING MACHINE
100" Niles Vert. Bor. Mill

DRILLS
No. 2 Avey Cam Fd.—1 spdl.—15" sw.
No. 2MA6 Avey—1 spdl.—24" sw.
No. 2LMS L-G—2 spdl.—20" sw.
No. 2MS Allen—3 spdl.—24" sw.
No. LBM L-G—3 spdl.—20" sw.
No. 3 Avey—2 spdl.—24" sw.
4'-11" Amer. Hole Wizard Radial
No. K60H Fox Multiple

GEAR MACHINES
11" Gleason Gear Generator
No. 36BM Gould & Eberhardt
No. 615A Fellows Gear Shaper
No. 612A Fellows Gear Shaper
No. 65 Fellows, Cone Drive
No. 12HS Gould & Eberhardt

GRINDERS
No. 2 Cincinnati Centerless
No. 4H—4"x12" Landis Plain Cyl.
5"x20" Norton Cam-O-Matic
5"x42" Norton Type C Pl.
6"x18" Norton Type C Plain
8"x15" Elgin EB-5C
10"x18" Norton Type C Pl. Cyl.
10"x36" Norton Type C
10"x36" Norton Type C Cam Gdr.
14"x48" Landis Type C Plain
14"x72" Landis Univ.
14"x168 Landis Pl.
16"x36" Norton Type C Pl.
16"-36"x72" Norton Pl.
18"x120" Norton Type A Plain
20"x192" Norton Type A Plain
24"x264" Norton Type A Plain
26"x72" Norton Pl.
No. TG615 J. & L. Thread Grinder
No. 81 Heald Int. Centerless
No. 74 Heald Int. Centerless
No. 72-A Heald Univ. Int.
No. 72A5 Heald Int. (1942)
No. 5 Bryant Internal
No. 5A Bryant Hole & Face
No. 5B Bryant Internal
No. 16-16 Bryant Internal
No. 16-28 Bryant Internal
No. 16A16 Bryant
No. 16A-28 Bryant Internal
No. 16F-28 Bryant Internal
No. 16-36 Bryant Internal
No. 24-36 Bryant Internal
No. 24-36 Bryant Internal
No. 24L-36 Bryant Internal
No. B24—25" chuck Arter Surf.
No. 16—30" Blanchard Rotary Surf.
No. 214 Besly Dbl. End Disc
#8 Badger Hanchett Double End Disc.
Hill-Clarke Cyl. Norton Type M.D.
10"x36" centers
10"x72" centers
10"x96" centers
14"x36" centers
14"x50" centers
14"x72" centers
14"x96" centers
18"x96" centers
18"-30" gap x 96" centers

LATHES
Monarch Speedi-Matic 2nd oper.
12"x21" Fay Automatic
No. 4D Potter & Johnston Auto.
16"x33" R-14 Seneca Falls
16 ML 16 Le Blonde Semi-Auto.
18"x27" ce American Grd. Hd.
27"x12' American Geared Hd.
36"x18' Putnam Geared Hd., M.D.
No. 2 Warner & Swasey Grd. Hd.
No. 2 Warner & Swasey Elec. Hd.
No. 5W Acme Universal
No. 6 Warner & Swasey, bar fd.
No. 7A Jones & Lamson
No. 2A Warner & Swasey
3A Warner & Swasey Turret (1942)
No. 3AL Gisholt Cross Slide
No. 3H-10 Libby International
No. 2A Warner & Swasey Turret Lathe
No. 4A Warner & Swasey M.D.
No. 4A Warner & Swasey (1944)

MILLING MACHINES
No. 2HL K. & T. Milwaukee Plain
No. 4 Cincinnati Dial Type Plain
No. 08 Cincinnati Vertical
No. 3K K. & T. Milwaukee Vert.
No. 4H K. & T. Milwaukee Vert.
118 Van Norman Hyd. Mfg. (1942)
Model A Briggs Mfg.
54"x30"x16' Ingersoll Slab
10"x60" Pratt & Whitney Thread
12"x102" HT Lees-Bradner Thread
No. 118 Van Norman Hyd. Mfg. Mill

PLANERS
48"x36"x14' Gray
60"x48"x27' American, 4 heads

MISCELLANEOUS
8 Spdl.—6" Goss & DeLeeuw Chucker
No. 56 Sundstrand Double End Cent. Mach.
15" Dill Slotter
18" Dill Slotter
Model 200 Micromatic Hor. Hone
Model H-7 Micromatic Vert. Hone
No. 224 Barnes Vertical Hone
No. 306 Barnes Vertical Hone
No. 6 R. & K. Straight Side Press
42"-ga. Economy Shear, M.D.

FULL MONEY-BACK GUARANTEE

Write, Wire or Phone **HILL-CLARKE MACHINERY COMPANY**
621 WASHINGTON BOULEVARD CHICAGO 6, ILL. · PHONE CEntral 6-5800

Practically New!

No. 2M1 CINCINNATI Vertical Milling Machine 16 speeds 25 to 1500 RPM, Table 49" x 10", Power feed to vertical head, 5 HP motor, new 1951.

O'CONNELL MACHINERY CO.
1695 GENESEE ST. BUFFALO 11, N. Y.

ELECTRIC FURNACE TO 1850°
with Auto Temperature Control. Sliding door. Cheap to operate. Substantial Dependable for Machine Shop Tool Room.
8" x 12" x 15" Inside 4.5 K.W. $300.00
12" x 16" x 20" inside 9.0 K.W. $500.00
E. H. WILLIAMS
BOX 9042A, HUNTINGTON, W. VA.

MACHINE TOOLS 1941-1955 MODELS GUARANTEED

CUTTER & TOOL GRINDERS
FELLOWS: Flat Top Helical Gear Cutter
OLIVER: 10" Template Tool Bit Grinder

DRILLING MACHINES
ALLEN: No. 2 Drill—6 spindle, 8"
ALLEN: #2½ High Speed 15" #3 MT
BARNES: No. 210 2-spindle, 21" swing
PRATT WHITNEY: ½Bx50" Deep Hole Reamer
RADIAL DRILLS: Archdale, 5', 6' & 7', new

GEAR & SPLINE MACHINERY
FELLOWS: #6I Shaper—35" dia.
FELLOWS: 6IA & 64A Shapers, 18" dia.
GLEASON: #12 Rough & Finish Generator
SYKES: Rask Cutting Machine 12" to 36"
FELLOWS: Gear Lappers, 8LSI and 13LSI
GLEASON: Testers, #3, and #6.
NAT. BROACH: SIC-12" Red Ring Tester
CLEVELAND: #130 & 140 Rigidhobbers
GEAR GRIND. MACH: GG-15 10"x24" Hydraulic
GLEASON: #17 Gear Grinder, 23½" P.D.
PRATT & WHITNEY: 10" & 18" Gear Grinders, 1 & 2 wheel
INTERNAL GEAR GRINDER: GG-31

GRINDERS—CYLINDRICAL
BROWN & SHARPE: #10 6"x18" plain
CINCINNATI: 6"x18" plain hydraulic
LANDIS: 16"x32" Type "D" Crankpin
NORTON: 12"x18" TYPE C Universal
NORTON: 10"x36" 30° Angle Wheel
NORTON: 10"x18" 45° Angle Wheel
NORTON: 10"x36" Plain

GRINDERS—INTERNAL
BRYANT: #112EY High Frequency
BRYANT: #5, 16-18, 16CP18, 18-28, 24L36
HEALD: #50 Planetary
HEALD: #72A3 Plain & Sizematic
HEALD: #72A5 65° Extended Bridge

GRINDERS—RADIUS
VAN NORMAN: #73 capacity 7½"
VAN NORMAN: #649-16, cap. 6" to 16" dia.
VAN NORMAN: #3½, Universal

HONING & LAPPING MACHINES
BARNES: Model 172, 2" dia. x 6" stroke
MICROMATIC: H-510 double and horiz., 2" dia.
MICROMATIC: H-2 single end 2 spindle, 1" dia.
FELLOWS: 8LSI & 13LSI Gear Lappers

LATHES—PRODUCTION
BLOUNT: Speed Lathe 12"x48"
LEBLOND: 16"x36" Semi-Automatic
LODGE & SHIPLEY: #3A Duomatic 25½"x27"
POTTER & JOHNSTON: #4D Auto Turret

LATHES—TURRET
BULLARD: 36" Vertical Turret
WARNER & SWASEY: #1A, #2A, #3, #3A, #4, #4A and #5
HERBERT: #0, #2, #4, #7, #8 and 9B30, new
WEBSTER & BENNETT: Vertical 30" & 48"
JONES & LAMSON: #8A bar feed
OSTER: #601 Turret

MILLING MACHINES
TAYLOR-FENN: M-80 Duplex Spline
RICE—BARTON: 4" Twin Spline
VAN NORMAN: 10CT Contour Miller

SAWS & CUT-OFF MACHINES
RUSSELL: 9½" Cut-Off Saw with Auto. Feed
RUSSELL: 5½" Cut-Off Saw with Auto. Feed
MOTCH & MERRYWEATHER: #3 Saw
MARVEL: #6A Hacksaw, 6"x6". Auto. Feed

THREAD MILLERS & TAPPERS
HALL PLANETARY: Mod "D" Thread Miller
LANDIS: 2½" Single head horiz. Threading
LEES BRADNER: #40A Thread Miller
LEES BRADNER: CT-36 Thread Miller
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. cap.
PRATT & WHITNEY: 4½x12" Thread Miller

MISCELLANEOUS
GARDNER: #84A Double Disc Grinder, 23" wheel
MOLDING MACHINES ROLLER JOLT: Osborne 2047-3
AUTOMATIC SCREW MACHINE: Wickman, Single Spindle, 7/16", new
TEST STAND: Denison 918-AM Hydraulic
HARDNESS TESTER: Gagan Brinell 16-B
SHEFFIELD PRECISIONNAIRE GAUGE
SUNDSTRAND: Double End #53 42" & 60" Centering Machines
HEALD: #22 Rotary Surface Grinder

TRIPLEX MACHINE TOOL CORP.
75A WEST ST. NEW YORK 6, N. Y.
ESTABLISHED 1919

PLAN FOR "55" WITH MOREY
AMERICA'S LARGEST STOCK
NEW-USED-REBUILT MACHINE TOOLS

AUTOMATIC SCREW MACHINES
ACME GRIDLEY R6, 1⅝", 6-spindle; late type
ACME GRIDLEY R8, 1⅝", 8-spindle; late type
CONOMATIC 1⅞", 8-spindle; M.D., late type
NEW BRITAIN GRIDLEY Model 665; 6-spindle chucker; latest type; new 1943.

BORING MILLS—Horizontal
NILES 8" bar; floor type; motor drive
HEALD 46B, 48A single end Borematic; M.D.
HEALD No. 45, 49 double end Borematic; M.D.
LUCAS #42 Precision Boring Milling & Drilling Machine
UNIVERSAL "TRI-WAY" 3" bar, M.D., late

BORING MILLS—Vertical
BULLARD 5', 8-spindle & 10" 6-spindle Type "D" Mult-au-matic; late type
BULLARD 36" spiral drive; PRT; late type
NILES 53", 2 swivel heads, PRT; M.D.
NILES 100" 2 swivel heads, PRT; M.D.
SELLERS 144", 2 swivel heads on cross rail; PRT

BROACHES
CINCINNATI 1-30 Duplex Vertical cap. 1 ton 30" stroke; Hydraulic; late
COLONIAL VGI-10-48 Vertical; Hydraulic; late type
LAPOINTE 10-54" Vertical, Model SRV; new 1947
OILGEAR 3XA horizontal; cap. 20,000 lb; 50" stroke; hydraulic; late type
OILGEAR type XL-6 single ram; late type.

DRILLS—Radial
AMERICAN 4' arm 11" col. "Hole Wizard", late type
AMERICAN 5' arm 11" col. "Hole Wizard", late type
AMERICAN 5' arm 13" col. "Hole Wizard", late type

DRILLS—Manufacturing
AVEY #2—2-spindle high speed, motor drive, late
BARNES #282 Heavy Duty Camel Back; late type
BARNES H-2 Hydram; 2" cap.; 22" swing; hydraulic
LELAND-GIFFORD 1LMS, 4-spindle, M.D.; late
LELAND-GIFFORD 2LMS, 2-spindle, M.D.; late
LELAND-GIFFORD 2LMS, 4-spindle, M.D.; late
NATCO B-4-B "Hole Steel" 60 adj. spindles; late
NATCO B-3-B "Hole Steel" 12 adj. spindles; late
NATCO E-5 high speed, 10 adj. spindles; late

FELLOWS GEAR EQUIPMENT
FELLOWS No. 6 High Speed Gear Shaper; late
FELLOWS No. 48 High Speed Gear Shaper; Internal cap. 72" diameter; late type
FELLOWS No. 6IA & 6I5A High Speed Gear Shaper
FELLOWS No. 6Z2 High Speed Gear Shaper; late
FELLOWS No. 7A, No. 72 and No. 75 High Speed Gear shaper; late type
FELLOWS No. 13 LS Lapper; motor drive, late
FELLOWS 20-M Red Liner; New 1953
FELLOWS 24-M Involute Measuring Machine; New 1952

GLEASON GEAR EQUIPMENT
GLEASON 3" Spiral Gear Generator; late type
GLEASON No. 7 Hyp. Cutter Sharp; latest type
GLEASON No. 13 Hyp. Cutter Sharpener; late
GLEASON 12" Spiral Bev. Cutter Sharpener; M.D.
GLEASON 12" Straight Bevel Generator; late type
GLEASON No. 14 Spiral Bevel Hyp. Gear Grinder
GLEASON #16 Hypoid Gear Generator, motor drive, late
GLEASON No. 17 Spiral Bevel, Zerol and Hypoid Gear Grinder, M.D., late type
GLEASON No. 18 Gear Tester and Lapper; M.D.
GLEASON No. 20 Spur Gear Tester; latest type
GLEASON #22 Hypoid Formate Gear Finisher; late
GLEASON 25" Straight Bevel Gear Gen.; M.D.
GLEASON 24" and 37" Bevel Gear Planer; M.D.
GLEASON 25" Spiral Bevel Gear Gen.; M.D.
GLEASON No. 6 Revacycle 5" cone distance; late

GRINDERS, Cyl. Plain & Univ.
BROWN & SHARPE #3 Univ. motor drive, late type
CINCINNATI 14"x72" Universal; M.D., late type
CINCINNATI 6"x18" Mod ER Plain, "Filmatic"; late
CINCINNATI #2 Centerless, Model EA Filmatic; late
LANDIS 20"x144" Plain Cyl. gap type, M.D., late
LANDIS 4"x12" Type H Hydraulic; late type
LANDIS 10"x18" type C Plain, Hydraulic, late
LANDIS 10"x36" type DC plain hydr. with infeed; late

Complete Catalog on request

NORTON 4"x12" Model CTU Plain, year 1953
NORTON 6"x18" Type "C" Plain; late type
NORTON 10"x48" Type C Hydr. Plain Cyl; late type
NORTON 16"x72" type "C" Plain; late type

LATHES, Turret
GISHOLT #1L and #2L Saddle type; Timken; late
GISHOLT #3 Universal ram type; M.D., late type
LIBBY #4H, 12" hole, motor drive, late type
MOREY #2, #3, #4, #5, ram type; Timken; latest
WARNER & SWASEY #1-A Universal; Hex., late
WARNER & SWASEY #2 Geared Head; late type

LATHES, Engine & Mfg.
GISHOLT #12 Hydraulic Automatic; motor drive; late
HENDEY 24"x36" centers; motor drive; late type
HENDEY 16"x72" centers Yoke Head, M.D., late type
LeBLOND 20"x48" centers, Timken; M.D., late type
LeBLOND 42"x108" centers, Timken; M.D., late type
LODGE & SHIPLEY 12"x30" centers, Toolroom
LODGE & SHIPLEY 14"x30" centers; late type
MONARCH Model EE 10"x20" centers, Toolroom; late
MONARCH 12"x30" centers; Model CKK; late type
MONARCH 16"x54" Centers, Motor Drive
MONARCH 16"x78" centers, Model CW, Timken, late type
NILES 30"x50' bed, single and boring, "Time Saver"
NILES 30"x108" c.c. Geared Head; Timken; late
NILES 36"x100" centers "Time Saver"; motor drive
PRATT & WHITNEY 16"x30" centers; Timken, late
SPRINGFIELD 20"x48" c.c., motor drive; late type
SUNDSTRAND 10"x60" centers; auto Type B; late

MILLING MACHINES, Plain
BROWN & SHARPE #2 M.D. late type
BROWN & SHARPE #10, motor drive; late type
CINCINNATI 1-18 Production; Timken; late type

MILLING MACHINES, Thread
HALL Style "D" Planetary; late type
LEES BRADNER Model #LT 6"x36" and 6"x72"; #HT 12"x24" and #HT 12"x36" centers; late type
MOREY 12"x30" and 12"x160" centers; late type

MILLING MACHINES, Universal
CINCINNATI #3 Dial Type, Timken, M.D., late
VAN NORMAN #22L, #26 and #36 ram type; late

MILLING MACHINES, Vertical
CINCINNATI #4 High Speed Dial type; late
CINCINNATI 0-8 Vertical; Timken; late type
CINCINNATI #3 Dial Type; High Speed, New 1953
KEARNEY & TRECKER #2H, #4H late

PLANERS
GRAY 48"x48"x10' "Maximum Service" 4 hds; PRT; DC; Reversing, Late type
LIBERTY 144"x76"x48" adj. openside; box table; 4 hds; vari-voltage; PRT; New 1940
NILES-BEMENT-POND 72"x72"x30"; 4 hds; PRT; DC; M.D.

PRESSES
BLISS #410A, 525-ton double action toggle drawing press; M.D.
NATIONAL #5 "Maxi-Press", 1000-ton cap. H.S. Forging Machine; M.D.
SHAW 250-ton Hydraulic flanging press; late type
WATERBURY FARREL #9, 125-ton cap., M.D.

SHAPERS
CINCINNATI 20"; motor drive; late type
GOULD & EBERHARDT 32"; High Speed; M.D.
HENDEY 12" High Speed Univ. Crank Shaper; late
MOREY 8" Vertical; motor drive; late type
ROCKFORD 24", hydraulic motor drive; late type.

MISCELLANEOUS
ALEXANDER #2, 3-dim. Engraving NEW 1952
BARNES No. 172 Honing; M.D., hydr.; late type
HILLES & JONES #7 Plate Bending Roll; capacity 7/8" x 16'; motor drive
LeBLOND No. 2 Deep Hole Reaming, late type
LeBLOND No. 2 Deep Hole Rifling, late type
MANVILLE No. 3 Bolt Head Trimmer, M.D.
MANVILLE 2C Screw Slotter, Motor Drive
MANVILLE No. 1 Screw Slotter, Motor Drive
HUGH SMITH cap. 1" thick plate x 25' between housings-Plate Bend. Roll, M.D.

Free Parking for Customers on Premises

MOREY MACHINERY CO. INC.
MANUFACTURERS • MERCHANTS • DISTRIBUTORS of MACHINE TOOLS
387 LAFAYETTE ST. NEW YORK 3, N.Y.
TELEPHONE ALGONQUIN 4-4550

Serving the World's Largest Manufacturers

MACHINE TOOLS

NEW - USED REBUILT MACHINERY

#2 B&S Plain Mill—Motor in Base.

#1212A Excello Double End Borematic—Late

72" Niles Bement Pond Vert. Boring Mill — older but good.

No. 47 Heald Single End Borematic Serial #4646

3'9" Morris Mor - Speed Radial Drill.

MDNA MEMBER

HAZARD BROWNELL MACHINE TOOLS INC.
350 WATERMAN STREET PROVIDENCE 6, R. I. DEXTER 1-8880

J. L. BLEASDALE
Sales Manager

26 years of selling
Quality tools.

FREE:

New Miles illustrated catalog of 1000 machine tools. Drop us a postcard with your name and address.

One of the men you deal with at MILES!

MILES OFFERS YOU:

- Original Precision • 34 Years Experience
- Over 1000 Tools in Stock • Unsurpassed Facilities
- Hard-to-Find Tools • Contract Rebuilding Service

BORING MACHINERY

3" bar Yoder table type, new 1942.
No. 2 Pratt & Whitney Jig Borer, Serial 323.
42" Bullard New Era vertical T/L
3¼" Bar No. 32 Lucas, horizontal, table type
36" Rogers vert. T/L side head, new 1942

DRILLS, RADIAL

4' arm 13" col. Carlton M.O.B.
9 ft. arm 16" column American, late type

GRINDERS, CYLINDRICAL

4"x18" Cincinnati pl. hyd., plunge cut, 1946
6"x16" Landis "C", 30 deg. head, 1941
10"x18" Cincinnati Hlmatic, type ER (2), 1941-1946
14"x36" Landis type C, hydraulic (2), 1946
16"/26"x72" Norton type C, hydraulic, 1945
16"/40"x120" Landis gap type, hydraulic, serial 16193
12" Model 22 Heald rotary surface, 1942
16A2 Blanchard rotary surface, serial 6046, 1946
14"x36" Pratt & Whitney vertical surface grinder, 1942.
72" No. 72 Hanchett rotary surface, 1946
No. 2 Cincinnati centerless (3), 1942-1943

LATHES, ENGINE

10"x18" Hendey toolroom, serial 29620
12"x30" Monarch model C, ser. CK16407, 1942
24"x48" Monarch toolroom, serial CK-14677, 1942
14"x42" Hendey G.H., M.I.B., 1940
24"x14 ft. bed American G.H., Q.C.G., serial 44070
24"x20' bed LeBlond heavy duty, DC motor, older
54"x30' bed Pond, DC motors, older but excellent

LATHES, MFG. & MISC. & TURRET

No. 5 Gisholt, pre-selector head, 1942
15"x30" Lipe Carbo-Matic, 1942
17"x72" LeBlond Rapid production (5), 1946-1947
No. 5 Jones & Lamson Universal ram type turret lathes, (2) late models

MILLING MACHINES

No. 2 Cincinnati Hl-Power plain horizontal
No. 4 Cincinnati Hl-power plain horizontal
No. 5 Cincinnati Hl-power plain horiz., vert. attach.
No. 4-36 and 4-48 Cincinnati Hydromatic production
No. 3B and 4K Kearney & Trecker plain, late type
No. 3B Brown & Sharpe plain horizontal, new 1942

PRESSES

500 Ton Baldwin Southwark Hyspeed Hydraulic 1938
1000 Ton No. 606 Toledo Forging
105 Ton No. 7¼ Verson O.B.I. (2)
150 ton No. 13-1 Cleveland O.B.I. late type
300 ton No. 1039 Hamilton S.A., D.C.
400 ton No. 603 Toledo knuckle joint
126 Ton No. 93½D Toledo D.C., S.S.
106 Ton No. 93C Toledo SS, DC air cushion
2 to 70 ton Ferracute punching (several)
3 to 60 ton O.B.I., most every make

WHEN YOU THINK OF MACHINERY, THINK OF

MILES MACHINERY COMPANY

2039 E. GENESEE AVE. PHONE 2-3105 SAGINAW 1, MICH.

WHAT DO *YOU* NEED?

MACHINE TOOLS— ENGINEERING — REBUILD

AUTOMATICS & CHUCKERS

6" Goss & DeLeeuw 8 Spindle—Work rotating

BORING MACHINES

(2) #11 Johnson Double End—(2) Spindle
49 Heald Single End—(1) Spindle
112C ExCello Single End—(2) Spindle

DRILL HEADS

#45 Rehnberg Jacobsen—1½ HP (8)

DRILLS—MULTIPLE SPINDLE

20V16 Snyder 20 HP Drive

GEAR EQUIPMENT

#3 Gleason Bevel Gear Generators—Straight (2)
Fitchburg—National Broach & Machine—Gear Grinding Machine Gear and Spline Grinders
135-A Cleveland Rigid Hob 4 x 42
#12 Barber Colmans—#3 Barber Colmans—6 & 7 Type Fellows

LATHES PRODUCTION

1F, 3F and 4F Foster Fastermatics—Turret or Platen Type
1H5, 1H6, 2H8 Libby Hevi-Duty Turret Lathes—Big Hole Spindles

MILLS

#4 Cincinnati—HiSpeed Dial Type
4-36 Cincinnati Production—Simplex
34-36 Cincinnati Production — Duplex w/tracers

SUPERFINISHER

4 x 18 Foster w/flat attach.

"HOME OF THE TOOL POST"

ERNEST HOLDEMAN & COLLET, INC.

820 N. WARD ST.
ELKHART, IND.
Phone 3-5310

BEFORE YOU BUY OR RENT

Consult

INDUSTRIAL RENTING CORP.

Rent all the machine tools you need from ONE SOURCE with terms designed to meet YOUR needs.

Our rates are as low as or lower than those offered by the government! Write for Brochure.

INDUSTRIAL RENTING CORP.
132 54 St., Bklyn., N.Y., HY 2-6563

MOST DIVERSIFIED STOCK IN THE U. S.

POWER PRESSES all types, 1-1000 ton
POWER PRESS BRAKES & POWER SHEARS
WIRE WORKING MACHINERY, Wire Drawing, Straightening and Cutting 4-Slide Wire Forming Machines
ROLLING MILLS, SLITTING MACHINES
BOLT & NUT MACHINERY
ROLL FORMING MACHINES
MACHINE TOOLS

"If it's machinery; we have it."

NATIONAL MACHINERY EXCHANGE
138 Mott St., N. Y. CAnal 6-2470

Here are a few of the more than 2000 Machines currently in stock...

AUTOMATICS

⅞" Cleveland Model B, belt
No. 6C Potter & Johnson, m.d.
14" Fay Flanders Type, m.d.
No. 8A Cleveland, m.d., 8" cap., latest
Model B—1-1/16" Cleveland, m.d.
Model A—1⅜" Cleveland Single Spindle, late
4 spindle—1⅜" Cleveland Model M, m.d.
No. 5 DELX Potter & Johnston, m.d., late
No. 6 DRELX Potter & Johnston, m.d., later type
Model A—2" Cleveland Single Spindle, late
2½" Cleveland, m.d., Model A

HORIZONTAL BORING MILLS

#7 Barrett Horizontal Boring Machine
3" Universal Horizontal Boring Mill, m.d.
25T Giddings & Lewis, m.d., late
No. 32 Lucas, m.d.
Barrett Double End, 7" and 5" spindles, m.d.
5½" bar Betts Floor Type, m.d.
5½" bar Niles-Bement-Pond, m.d.
6" Bar Newton No. 2 Cylinder Borer, m.d.
10" bar Sellers Floor Type, m.d.
Floor Plates—all sizes

VERTICAL BORING MILLS

24" Bullard, 1943
36" Bullard, m.d.
42" Bullard Spiral Drive, m.d. 1942
42" Bullard New Era, m.d.
42" King, with side head and plain swivel head on rail, 1940
44" Putnam, m.d., p.r.t.
44" Niles, m.d., p.r.t.
48" Niles-Bement-Pond Car Wheel Borer, m.d.
53" Niles Heavy Pattern, m.d., p.r.t.
100" Niles Heavy, m.d., p.r.t.
102" Niles Wheel Turning Boring Mill
12' Niles, m.d., p.r.t.

BROACHING MACHINE

75 H.P. LaPointe Hydraulic Broach, m.d.
12x72" Thompson Automatic Flat Broach, m.d.
10 ton, 84" stroke Single Ram Vertical Surface LaPointe, m.d., late
Type SBD-42-8 American Vertical Hy. Dup. Broach
Type SBD-48-15 American Vertical Dual Ram Surface Hydr. Broach
Oilgear Hydraulic Broach, type XA, 54" stroke, m.d.

RADIAL DRILLS

2'-9" col. Fosdick, m.d.
3'-9" col. Cincinnati, Bickford, m.d.
3'-13" col. Cincinnati, Bickford, Super-Service, m.d.
4'-11" col. Morris, m.d. on arm
5'-13" col. American, m.d.
5'-14" col. Carlton, m.d.
7'-16" col. American Triple Purpose, m.d.
7'-17" col. American Universal Table
8'-17" col. American Triple Purpose
8'-17" col. Drese, gear box m.d.
8'-19" col. Cincinnati-Bickford Super-Service, m.d.
Zewo Precision Universal Bench Type Radials, m.d., new
Baush Radial Drilling & Tapping Machine, m.d.

HORIZONTAL DRILLS

3 way Natco Horizontal Drill, consisting of 3 E13 Heleunits
No. ½Bx30" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d.
No. ½Bx50" Pratt & Whitney Gun Barrel Rifling Machine, m.d., latest
No. 1Bx74 Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d.
No. 1½x105" Pratt & Whitney 2 spindle Gun Barrel Rifling Machine, m.d.
No. 1 Pratt & Whitney 2 spindle Deep Hole Drill, belted m.d.
Model 410 W.F. & John Barnes 2 spindle Hydraulic Deep Hole Drill, m.d.

UPRIGHT DRILLS

D4 Colburn, m.d.
No. D6 Colburn Heavy Duty, m.d.
20" Cincinnati Bickford Super Service Production Drill, m.d.
24" Aurora, m.d.
24" Cincinnati Bickford, m.d.
26" Aurora, m.d., taper
32" Aurora, belt drive
36" Cincinnati Bickford, belt drive
No. 2 Colburn Mfg. Type, m.d.
No. 315 Baker Heavy Duty, s.p.d.
No. 417 Baker, m.d., later type
No. 513 Baker, m.d.
#4—48" Defiance Machine Co. Drill, m.d.

GEAR SHAPERS

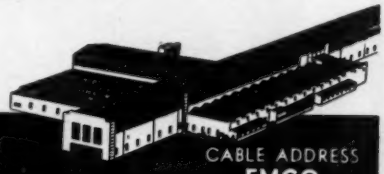
No. 12 and 18 Fellows Gear Shaving Machines, m.d., late
No. 6 Fellows, belt drive
No. 77A Fellows Gear Shapers, belted m.d.
No. 18 Fellows Gear Finishing Machine, m.d.
No. 6I Fellows, belted m.d.
No. 6I Fellows, gear box, m.d.
No. 61A Fellows, m.d., latest type
No. 64S Fellows, m.d.
No. 645A3 Fellows, m.d.
No. 75 Fellows High Speed, m.d.
No. 75A Fellows, m.d.
No. 712 Fellows, m.d.
No. 4 Fellows Gear Generator, m.d.
No. 715A Fellows High Speed Gear Shaper, m.d.

GEAR CUTTERS

No. 12 Gleason Straight Tooth Bevel Gear Rougher, m.d.
No. 36BM Gould & Eberhardt Spur Gear Cutter
Gleason Spiral Bevel Gear Rougher, m.d.
No. 3—36" Brown & Sharpe Gear Cutter
No. 4B Fellows Gear Burnisher
No. 8B Fellows Gear Burnisher
3" Gleason Gear Generator, m.d.
8" Gleason Gear Generator, m.d.
11" Gleason Gear Generator, m.d.
No. 6-60 Brown & Sharpe Gear Cutter, m.d.
Cincinnati Gear Burnisher, m.d.

GEAR GRINDING MACHINES

6x20" Fitchburg Hydraulic Spline & Gear Grinder, m.d.
9" Pratt & Whitney Hydraulic Spur and Helical
No. 13LS Fellows Gear Lapper, m.d.
SG11 Gear Grinding Machine, m.d., latest
GG19 Gear Grinding Machine, m.d., latest
GG31 Gear Grinding Machine, Internal Gear & Spline Grinder, m.d.
10" Pratt & Whitney Model M1639 Single Wheel Gear Grinder, m.d.
18" National Broach Red Ring Gear Lapper, m.d., late



ABOVE ONLY A PARTIAL LISTING—SEND FOR COMPLETE STOCK LIST

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio — MElrose 1241 — CABLE ADDRESS EMCO

MACHINERY BARGAINS

3—Bliss #505 straight side crankshaft type, solid frame presses, with motors. Two are single gear type, serial #93021 and 93022. One non-gear type, serial #96579.

1—Heald #74 internal grinder, serial M-1205, with motor.

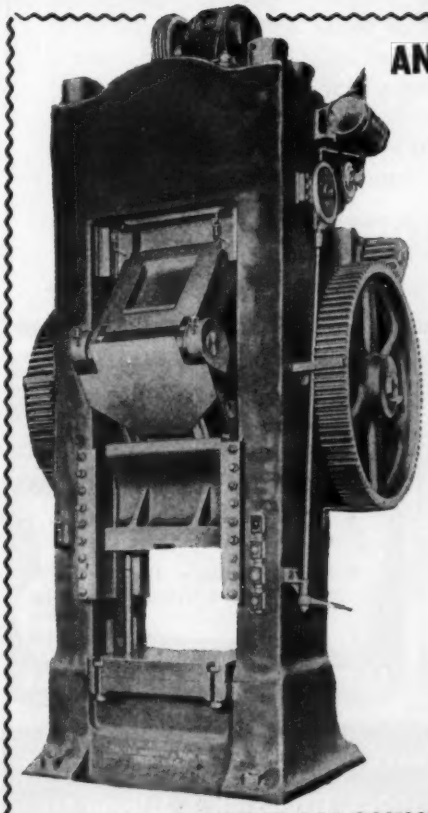
2—Detrex continuous conveyor type degreasers. One model #325 serial #2375 and one model DC 650—serial P-609G.

1—Ferracute DAG55 double acting, single geared, solid frame press. Seventy tons capacity, serial #8410, with motor.

2—Seneca Falls, serial #B4968, 8" x 60" lo-swing geared head lathe with two front power feed carriages, one 18" wide. The other 24" wide. Two automatic back squaring attachment. One 8" wide. The other 12" wide. Two steady rests. Serial #4967 is the same except with one 11" wide automatic back squaring shaft.

CENTURY ELECTRIC CO.
1806 Pine Street—St. Louis 3, Mo.
Ph.—F. W. Van Luik—Central 1-4920

MOTORS · GENERATORS
TRANSFORMERS
NEW · REBUILT
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT CO.
PHONE STATION COLLECT GL 6783
P.O. BOX 51 ROCHESTER 1, NEW YORK



AN OUTSTANDING VALUE

BRAND NEW 800 TON BLISS MODEL 26 KNUCKLE-JOINT PRESS

Packed in Original Boxes. Manufactured in 1952. Serial Number 34392. Air Friction Clutch, stroke of slide 5", shut-height, stroke down adjustment up 26". Bed area 32" F.B. x 27" R.L. Distance between uprights 28". Slide area 16" F.B. x 20½" L.R. Press furnished with two station air operated Dial Feed. 20 HP A.C. Motor.

PRESENT DAY PRICE
Approximately $48,000

OUR PRICE $29,500

Send for our 32 page illustrated Catalog packed with bargains

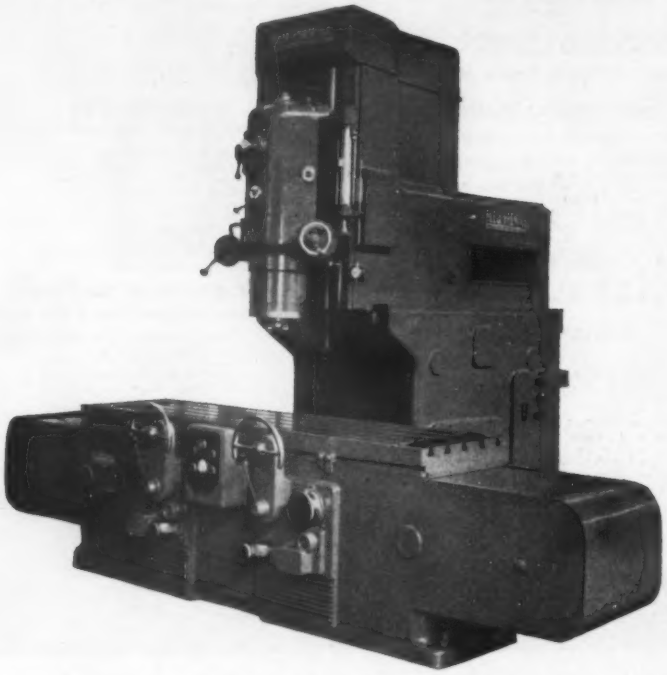
AARON MACHINERY CO., INC.
45 CROSBY ST. **Phone WAlker 5-8300** **NEW YORK 12, N. Y.**

SEARCHLIGHT SECTION

EMERMAN OFFERS FROM STOCK

FOR SALE OR RENT

#4 Reed Prentice Vertical Miller



Range Longitudinal Travel of table 48"-60". Travel of cross slide 24" Vertical travel of spindle head 12" Throat distance 33". Table working surface (size overall) 24" x 84"—24" x 96" spindle. National Standard spindle nose #50. Number of speeds 30—1200 R.P.M. Feeds number —infinitely variable power rapid traverse.

EMERMAN MACHINERY CORP.

879 West 120th St. Ph: PUllman 5-7626 Chicago 43, Illinois

Natco Nos. G5 & 12C Drills, M.D.
Gleason 3" Str. Bevel Gear Gen.
Rivett No. 918 2nd-oper. Lathe.
P & W 30" Vert. Profiler, 2-spindle.

D. E. DONY MACHINERY CO.
4357 St. Paul Blvd., Rochester 17, N. Y.

10'-16' CINCINNATI Hypro Extension Vertical Boring & Turning Mill, Late Model and Like New. Motor Drive.

WIGGLESWORTH INDUSTRIAL CORP.
68 Border St., E. Boston 28, Mass.

FOR SALE
10 x 48 HANSEN WHITNEY
THREAD MILLER
Radax Manfg. Co., Inc.
124 Market St., Rochelle Park, N. J.

CUTTING TOOLS

New high speed corner rounding end mills for sale at sacrifice. List price $12.72 each. Buy now for only $3.00 each, $30.00 per dozen, postpaid, while they last. Other high speed cutters as low as $6.00 per dozen. Send check today, or ask for List No. 5.

SALME ENTERPRISES
40 Greendale Ave., Worcester 6, Mass.

MACHINERY FOR SALE
ATTENTION EXPORTERS

Unusual opportunity to procure modern Fellows Gear Shapers 615A and 645 as well as 12" Gleason Generators, 36 BM Gould & Eberhardt Rougher, 27 Fellows Gear Shaper, #16 D. E. Whiton Machine. Write for full information.

FS-1633, AMERICAN MACHINIST
330 W. 42 St., New York 36, N. Y.

Your inquiry will have Special Value . . .

If you mention this magazine, when writing advertisers. Naturally, the publisher will appreciate it . . . but, more important it will identify you as one of the men the advertiser wants to reach with his message . . . and help to make possible enlarged future service to you as a reader.

BENNETT MACHINERY CO.

GUARANTEED MACHINE TOOLS

BORING MILLS,
84" King, 3 Hds., 1943
42" & 54" Bullards, Spiral
3¾" Bar Defiance, Table Type, Late
3" Bar Yoder, Table Type, 1943
4½" bar Sellers Floor Type
RADIAL DRILLS, 5'15" col. Amer., Motor-on-Arm
No. 72A3 Heald Int., Late
12"x48" Landis Univ. "C" Hyd.
GEAR SHAPERS, Nos. 645A3, 61A & 61 Fellows
KEYSEATERS, Nos. 6A, 5, 4, & 2 M. & M.
LATHES, 16" x 154" Con. Hendey, T.A., Tim.
20"-32"x168" Con. Amer. Pacemaker, '49
MILLERS, No. 4S Cincl. Univ., Vert. Attach.
No. 3H Hor. & 4H Vert. K. & T.
SLOTTERS, 20"x24" & 12" Drill-Lobdells
36" Rockford Hyd. 1942

375 Allwood Rd., Clifton, New Jersey
Phone PRescott 9-8996 N. Y. Phone LOngacre 3-1222

Indianapolis MACHINERY & SUPPLY CO.
1961 South Meridian Street
Indianapolis 6, Indiana

- TG 6x36 Jones & Lamson Precision Thread Grinder 1943
- No. 35 Excello Precision Thread Grinder 1942

Write for Complete Stock List

LATE TYPE MACHINE TOOLS

WORLD'S LARGEST STOCK

PRESSES

JOSEPH **HYMAN** & SONS
TIOGA, LIVINGSTON & ALMOND STS.
PHILADELPHIA 34, PA. • REGENT 9-7727

Index of PRODUCTS ADVERTISED

In This Issue

Abrasives, Coated.....18-19, 29, 30, 303

Accessories & Attachments (Machine Tool).....32A, 96, 203, 216, 232, 244, 276, 280, 324, 328

Balancing Machines..... 26

Bearings.....4th Cover, 27, 310, 323, 329

Bending Machines.....204, 287, 325

Books, Technical..... 326

Boring, Drilling & Milling Machines (Horizontal).....14-15, Insert Bet. 32A-32D, 89, 327, 333, 354

Boring Machines Internal..... 2d Cover

Boring & Turning Machines (Vertical).....84-85, 102, 354

Broaching Machines.....79, 165, 166

Brushes.....189, 205

Castings.....76-77, 91, 214

Centering Machines..... 286

Centers, Live.....203, 280

Centrifugal Machines..... 339

Chucks.....203, 208, 218, 221, 224, 262, 328, 336, 349

Cleaning & Drying Machines & Supplies..... 268

Collets..... 203

Compressors, Air..... 28

Controls, Electrical.....Insert Bet. 68-69, 317

Coolant Systems, Filters & Supplies.....247, 339

Cut-Off Machines.....64B, 299

Cutters, Abrasive.....288, 293

Die Casting Machines..... 229

Die Sets..... 217

Dressers.....334, 353

Drilling Machines.....33, 73, 87, 95, 165, 261, 281, 296, 352

Drill Jig Bushings.....216, 294

Duplicators & Pantographs.....258, 328

Electro Plating & Polishing Equipment & Supplies..... 339

Engineering & Production Services..... 335

Fabricating Methods & Services.....257, 280

Fasteners.....3rd Cover, 74-75, 168, 193, 297

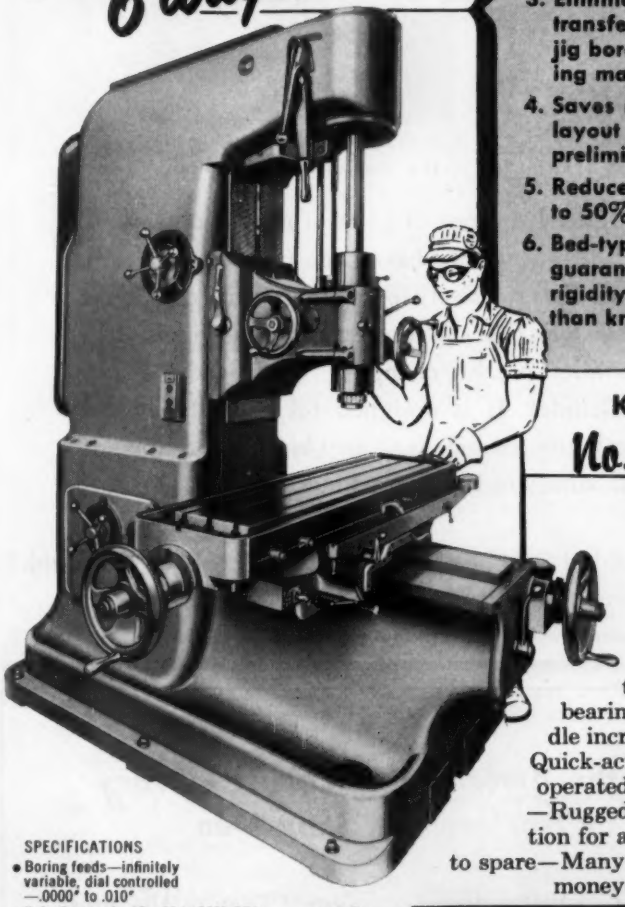
(Continued on page 348)

From the *American Machinist* Library of *Tips for Top Shop Men*

THE common belief that "perishable tools" are written off when they go out to the machine is one of today's most expensive notions. Unless control is exercised *in use* as well as in stocking, the machine, method or man that breaks or ruins an excessive number of tools is never spotted. In one test, ratio of tool use on two machines of the same type on the same job was 1 to 7.

How 1 Machine Can Save Time & Money 6 Ways!

1. A precision jig borer with extra talent!
2. Also handles an extreme range of difficult milling operations
3. Eliminates work transfers between jig borers and milling machines
4. Saves much of the layout work and preliminary drilling
5. Reduces job time up to 50% or more
6. Bed-type table guarantees greater rigidity and accuracy than knee-type



KNIGHT'S No. 50

Exclusive dial-controlled infinitely variable spindle feeds—Extra-long travel of the 1-piece roller bearing-mounted spindle increases capacity—Quick-action controls, all operated from 1 position—Rugged, rigid construction for accuracy—Power to spare—Many other time-and-money-saving features!

SPECIFICATIONS
- Boring feeds—infinitely variable, dial controlled —.0000" to .010"
- Spindle speeds, 16—40 to 2000 RPM
- Vertical capacity—28"
- Table travel—longitudinal 28"; cross 18"
- Table feeds—dial type, 16
- Table feeds—per minute, 5/16" to 20"
- Table rapid traverse—both directions 100"
- Horsepower—7½
- Weight—8100 lbs.

KNIGHT VERSATILE MILLERS ACCURATE • RIGID

ATTACH TO COMPANY LETTERHEAD

Please send catalog on No. 50 and other Knight boring and milling machines.

Name.....

Title.....

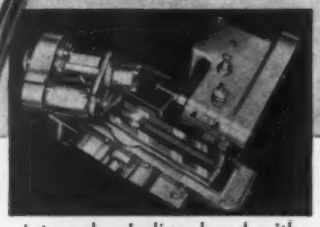
☐ Send information on Knight's 20" and 42" Rotary Tables

W. B. KNIGHT MACHINERY CO.
3920 W. Pine Blvd. · St. Louis 8, Mo.

ARTER

Dual Purpose cylindrical and internal grinder for ECONOMICAL PRODUCTION

• In the tool room
• On production work



Model EG-103

Internal grinding head with the work head swivelled.

Arter Model 103 is one of a line of precision grinders of many types which we have been building for over thirty years. This relatively low-priced grinder is a dual purpose machine that can be arranged as a Plain Cylindrical Grinder or, by changing wheelheads, as an Internal Grinder. It is designed for use wherever a small-in-capacity machine is needed as prime equipment or as an auxiliary to larger machines.

ARTER GRINDING MACHINE COMPANY
WORCESTER • MASSACHUSETTS
Agents in industrial centers of United States and Canada

From the *American Machinist* Library of *Tips for Top Shop Men*

SPECIAL jobs take special doing. They're the most profitable places to try special tools, special coolants, special operators. Too often the tendency is to be content with any method that will do the job at all.

Index of PRODUCTS ADVERTISED

In This Issue

•

(Continued from page 347)

Files, Hand 295
Forgings 236, 307
Gages & Instruments 16, 42, 48, 86, 199, 203, 234, 238, 245, 318, 334, 336, 338
Gear Cutting Machines 3, 6-7, 92-93, 166, 324
Gears, Speed Reducer, Motor Reducers 32, 201, 252, 260, 265, 292, 296, 301, 324, 353
Gear Testers 3, 6-7
Grinders—Cutter & Tool 80, 94, 108-109, 272
Grinding Machines—Production 4-5, 8-9, 12-13, 32D, 80, 88, 231, 241, 348, 356
Grinding Wheels 18-19, 29, 65, 209
Heads: Drilling, Grinding & Tapping 10-11, 324, 338
Heat Treating Equipment & Supplies 64, 219, 355
Honing Machines 104, 261
Hydraulic & Pneumatic Parts & Equipment 28, 78, 275
Industrial Financing Plan 20-21, 320
Jig Borers 312, 347, 351
Lathes, Automatic 22-23, 53
Lathes, Engine 36-37, 43, 44-45, 90, 191, 239, 270-271, 290, 309, 327, 331, 338
Lathes, Turret 22-23, 53, 54-55, 60-61
Lubricants, Cutting Fluids, Quenching Oils & Solvents 35, 98-99, 170, 197, 253, 259, 304
Lubricating Systems & Equipment 243
Magnets 351
Marking Machines, Tools & Supplies 222, 334
Materials, Cutting & Forming 62, 69, 70-71, 72, 110, 225, 242, 252, 264, 274, 298, 321, 334
Materials of Manufacture 82-83, 195, 223, 228, 266, 269, 274, 291, 306
Materials Handling Equipment 28, 242, 251, 339, 351
Millers, Die Sinkers, Profilers 22-23, 34, 88, 316, 322, 337, 347
Nibbling Machines 293

Index of PRODUCTS ADVERTISED

In This Issue

Polishing & Buffing Machines 205
Power Transmission 255, 282, 311, 315
Presses, Forging & Forming Equipment & Supplies 31, 39, 47, 64B, 66-67, 81, 100, 113, 114, 215, 226-227, 236, 244, 254, 278-279, 285, 288, 294, 298, 299, 326, 330, 332, 335, 350, 355
Production, Inventory & Tool Control 272
Pumps, Circulating 203, 260

Riveting Machines 334
Rust Preventives 288

Safety & Welfare Equipment 308
Saw Blades 52, 106, 276, 284, 324, 332
Sawing Machines 52, 106, 250, 300
Screw Machines; Chucking Machines 17, 22-23, 50, 59, 235, 240
Shapers, Slotters, Keyseaters 116, 254, 280, 334, 336
Shop Furniture 234
Special Machine Tools 56-57, 60-61, 172, 273, 277, 280, 283, 305
Spindles, Machine 286
Stampings 220
Swaging Machines 237

Tapping Attachments 302, 322, 338
Tapping Machines 281, 336
Thread Cutting Machines 10-11, 69, 70-71, 72, 286, 338
Thread Rolling Machines & Tools 212-213, 237
Tooling Set-up Equipment 286
Tools, Cutting ..... 24-25, 38, 40-41, 42, 49, 51, 58, Insert Facing 64, 68, 79, 92-93, 97, 166, 234, 246, 248, 252, 256, 267, 284, 289, 296, 313, 321, 332
Tools, Hand 230
Tools, Measuring 238
Tools, Portable 263, 314
Transportation 249

Used & Surplus Equipment 342-346

Vibration Control 233
Vises 96, 272, 302, 330

Welding & Cutting, Brazing & Soldering Equipment & Supplies 46, 63, 206-207, 210-211, 257, 319

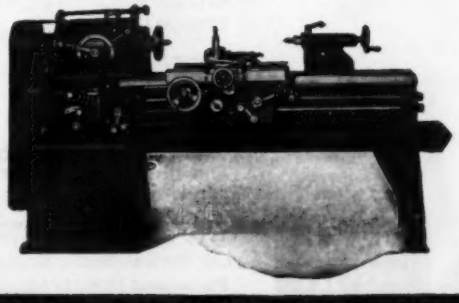
Industry required a 48-inch diameter Rotary Permanent Magnetic Chuck. O. S. Walker Company, Inc., Worcester, Mass. responded by designing and building this permanent chuck, the world's largest—and larger sizes are now available. Whatever your holding problems —magnetic or vacuum—Walker engineers have the answer. They are as close to you as your telephone—Worcester, Mass. PLeasant 6-6293.

C & J 12-SPEED GEARED HEAD LATHES

WRITE FOR BULLETIN 39-A-10

With many features found on higher-priced, larger lathes, such as: CLUTCH AND BRAKE at no extra cost, SEPARATE ROD FOR FEED, THREAD INDICATOR and many others.

23⅜" carriage.



CARROLL & JAMIESON MACHINE TOOL CO.
BATAVIA, OHIO

From the *American Machinist* Library of *Tips for Top Shop Men*

DON'T underestimate the effect of an unsound sales budget on production efficiency. Inaccurate forecasts mean fluctuating schedules, a changing work force, and low worker morale.

Here is a completely new electric-hydraulic forcing and straightening press, with construction and operating advantages never before offered in a low-cost shop press.

These are a few of the features:

- **Rapid Ram Approach** — Automatically changes to power stroke when it contacts the work.
- **Movable Workhead** — Self-contained—easy to center over the work. Workhead can be purchased separately.
- **Variable Ram Speed** — From zero to maximum under fingertip control.
- **Modern Design** — All operating controls at convenient working height.

These and dozens of other features are fully described and illustrated in new Bulletin No. 347, which we will send promptly on request. Send the coupon today.

DAKE PRESSES

DAKE ENGINE COMPANY
636 Seventh Street, Grand Haven, Mich.
Please send Bulletin No. 347
Name_____
Company_____
Address_____
City_____ Zone____ State_____

INDEX TO ADVERTISERS

This index is published as a convenience to the readers. Every care is taken to make it accurate, but AMERICAN MACHINIST assumes no responsibility for errors or omissions

	Page
Acromark Company	334
Adams Company	324
Air Reduction Sales Company Div. of Air Reduction, Inc.	210-211
Alemite	243
Allen-Bradley Company	Insert Bet. 68-69
Allen Mfg. Co.	297
Allis-Chalmers Mfg. Co.	64
Allison Company	288
American Broach & Machine Co.	79
American Chain & Cable Co., Inc.	251, 293
American Chain Div. American Chain & Cable Co., Inc.	251
American Gear & Mfg. Co.	265
American Optical Co.	308
American Saw & Mfg. Co.	276
American Smelting & Refining Co.	91
American Steel Foundries, Elmes Engineering Div.	100
American Tool Works	33
American Welding & Mfg. Co.	46
Apex Machine & Tool Co.	230
Apex Tool & Cutter Co., Inc.	296
Armstrong-Blum Mfg. Co.	52
Armstrong Bros. Tool Co.	32A
Arter Grinding Machine Co.	348
Atlantic Refining Company	304
Austin Industrial Corp.	336
Automotive Gear Works, Inc.	301
Automotive Service Tools, Inc., Div. Lansing Die Sinking	258
Bachmann Co., Inc., Eric R.	88
Baird Machine Company	285
Baldwin-Lima Hamilton Corp.	39
Barber-Colman Company	92-93
Barnes Drill Company	261
Barnes Co., W. F. & John	56-57
Bath Co., Inc., John	42
Besly-Wells Corporation	256
Bethlehem Steel Company	225
Bilgram Gear & Machine Company	324
Blanchard Machine Co.	32D
Bliss Co., E. W.	81
Bodine Corp.	283
Boye & Emmes Machine Tool Co.	290
Bridgeport Machines, Inc.	322
Bryant Chucking Grinder Company	50
Bryant Machinery & Engineering Co.	73
Buffalo Forge Co.	226-227
Bullard Co.	Insert Bet. 32A-32D
Bunting Brass & Bronze Co.	223
Butterfield Div., Union Twist Drill Co.	38
Campbell Div. Andrew C. American Chain & Cable Co., Inc.	293
Carboloy Dept. of General Electric Co.	69, 70-71, 72
Card Mfg. Co., S. W.	58

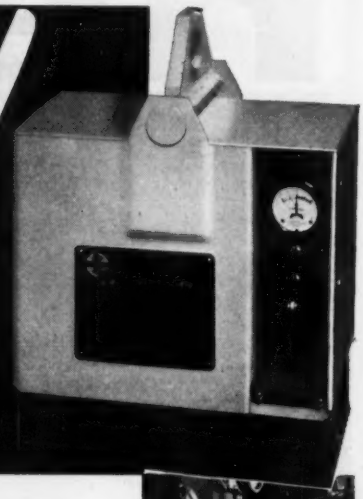
INDEX TO ADVERTISERS

	Page
Carroll & Jamieson Machine Tool Co.	349
Challenge Machinery Co.	234
Chandler Tool Company	338
Chase Brass & Copper Co., Inc.	291
Chicago Pneumatic Tool Company	314
Cincinnati-Bickford Tool Co.	87
Cincinnati Gear Co.	252
Cincinnati Grinders, Incorporated	4-5
Cincinnati Milling Machine Co., Grinding Wheels Division	65
Cincinnati Shaper Co.	116
Circular Tool Company	284
C.I.T. Corp.	320
Cities Service Oil Co.	253
Cleereman Machine Tool Company	73
Cleveland Crane & Engineering Co.	114
Columbia Div. Lodge & Shipley Co.	64B
Columbia Tool Steel Company	242
Columbus Die-Tool & Machine Co.	280
Comtor Company	334
Cone Automatic Machine Co.	17
Connors & Davis Sales Corp.	330
Consolidated Machine Tool Corp.	84-85
Cosa Corporation	312
Coulter Machine Co., James	338
Cross Company	172
Crucible Steel Co. of America	62
Curtis Pneumatic Machinery Div. Curtis Mfg. Co.	28
Cushman Chuck Company	221
Dake Engine Co.	350
Davis Boring Tool Div. Giddings & Lewis Machine Tool Co.	68
Davis & Thompson Co.	354
Davis Keyseater Company	334
Delta Power Tool Div., Rockwell Mfg. Co.	270-271
Denison Engineering Company	113
Desmond-Stephan Mfg. Co.	353
Detroit Die Set Corp.	217
Detroit Reamer & Tool Co.	267
Disston & Sons, Inc., Henry	306
DoAll Co.	300
Dodge Mfg. Corp.	315
Duria-Werke, K. G.	334
Eastern Machine Screw Corp.	324
Eastman Kodak Co. (Industrial X-Ray)	199
Economy Engineering Co.	272
Edlund Machinery Company	352
Elmes Engineering Div. American Steel Foundries	100
Engleberg-Huller Company	231
Engineering & Research Div. of ACF Industries	335
Erie Foundry Company	236
Euclid Crane & Hoist Company	242
Ex-Cell-O Corporation	102
Fafnir Bearing Company	329
Federal Press Company	47
Fellows Gear Shaper Company	6-7
Felters Company	233

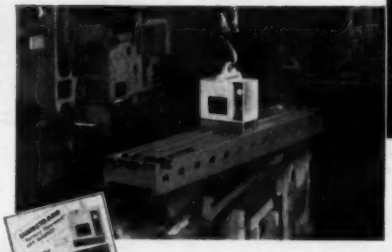
(Continued on page 352)

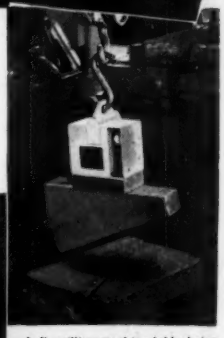
NEW!

SUNDSTRAND "Battery Operated" LIFT MAGNET



Here's the new Model 50 Sundstrand self contained lift magnet with a lifting capacity of 2,000 lbs. It eliminates chain or rope hitches and length of haul is not restricted by cords or wires. It's operated by a 6 volt wet cell automobile battery. A recessed control panel contains an operating switch, a dial to indicate the need for re-charging and a receptacle for a trickle charger plug. It has a 7" x 12½" magnetizing surface and weighs only 120 lbs.





Left, milling machine table being lowered into position on machine base.

Above, odd shaped parts are easily handled with Sundstrand Lift Magnet.

FREE DATA Write for complete information on this new efficient "Battery Operated" lift magnet. Ask for bulletin 153-M.

SUNDSTRAND POWER-GRIP ®

SUNDSTRAND Magnetic Products Co.

Division of Sundstrand Machine Tool Co.
1020-9th ST. • ROCKFORD, ILLINOIS

Save your large JIG BORERS for large jobs... put small precision work on the LINLEY...

The Linley Jig Borer provides the means . . . at very low cost . . . of handling your most exacting requirements in precision. With it you can cut costs through having a tool exactly fitted to your small work . . . save your larger machines for larger work.

Specifications

Table Movement: 6" x 10" Table Size: 7" x 17½"

Send for complete information TODAY!

LINLEY BROTHERS CO.

664 STATE ST. EXT., BRIDGEPORT 1, CONN.

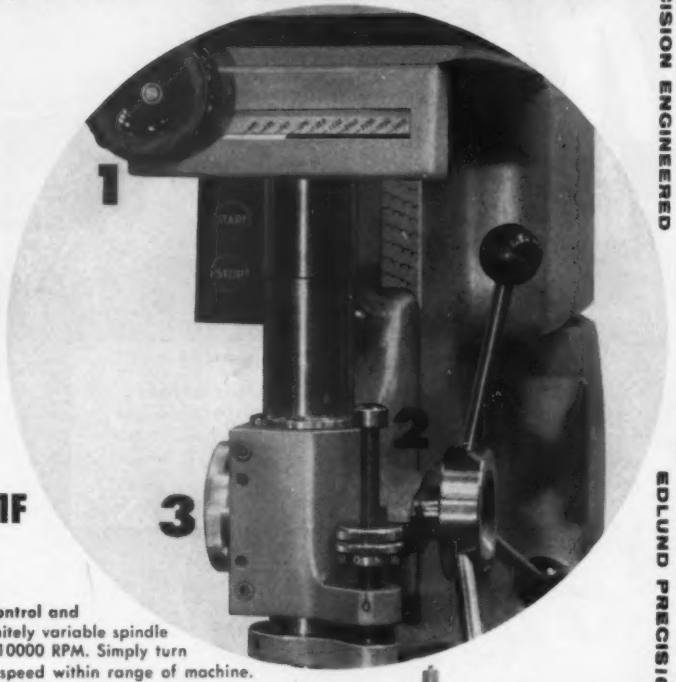
EDLUND PRECISION ENGINEERED EDLUND PRECISION ENGINEERED

new
SENSITIVE DRILLING MACHINE

EDLUND PRECISION ENGINEERED EDLUND PRECISION ENGINEERED EDLUND PRECISION ENGINEERED EDLUND PRECISION ENGINEERED

EDLUND

Model 1F

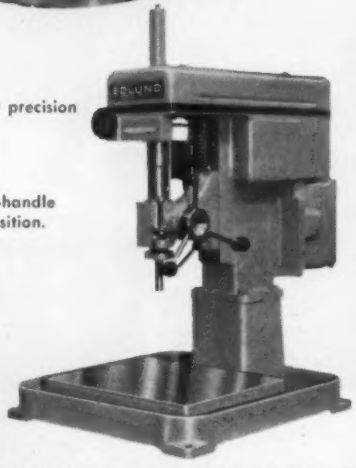


1
Vari-Speed Control and Indicator Infinitely variable spindle speeds up to 10000 RPM. Simply turn knob for any speed within range of machine. Swift, Powerful, Positive Action.

2
Micrometer Graduated Depth Gauge
Permits accurate prepositioned depth control for precision drilling. Clearly graduated to .001".

3
Adjustable Spindle Tension Control
Compensates for weights of various drills. Three-handle feed lever lets operator choose best feeding position.

Specifications
Overhang.....7"
Capacity (Cast Iron).....⅜"
#1 Morse Taper or Jacobs Chuck...0-⅜"
Speed Range—Optional.....
625 to 3000 RPM
1250 to 10000 RPM
Pedestal or Bench Models
Send for Free Illustrated Bulletin #160



EDLUND
MACHINERY CO.
Division Bradley-Edlund Corp. Cortland, N. Y.

EDLUND PRECISION ENGINEERED

Edlund Representatives in Major Cities.

From the *American Machinist* Library of *Tips for Top Shop Men*

STUDY merchandising's technique for introducing a new product. It'll pay you to try the same methods when installing new equipment. You'll avoid resistance not only from workers but also from foremen.

INDEX TO ADVERTISERS

(Continued from page 351)

	Page
Fenn Mfg. Co.	237
Foote-Burt Co.	165
Foote Gear Works, Brad.	265
Forkhardt, K. G., Paul	328
Fuller Brush Company	205
Gairing Tool Company	332
Gallmeyer & Livingston Co.	356
Gardner Machine Co.	29
Gates Rubber Co.	282
Gear Specialties, Inc.	32
German American Trade Promotion	328
Giddings & Lewis Machine Tool Co.	14-15, 68
Gisholt Machine Co.	26
Gleason Works	3
Gorham Tool Co.	97
Goss & DeLeeuw Machine Co.	240
Grant Gear Works, Inc.	296
Grant Mfg. & Machine Co.	334
Graphic Systems	272
Greaves Machine Tool Company	316
Greenfield Tap & Die Corp.	Insert facing 64
Greenlee Brothers	235
Hanchett Mfg. Co.	262
Hannifin Corporation	254
Hardinge Brothers, Inc.	90
Hartford Special Machinery Co.	277
Haynes Stellite Co., Div. Union Carbide & Carbon Co.	274
Heald Machine Co.	2nd Cover
Hebert Equipment Co.	286
Heller Machine Co.	34
Henry & Wright Div. Emhart Mfg. Co.	279
Holo-Krome Screw Corp.	3rd Cover
Honan-Crane Corp.	247
Hones, Inc., Charles A.	355
Houghton & Co., E. F.	35
Houghton Laboratories, Inc.	228
Hunter-Douglas Corp.	307
Hydraulic Press Mfg. Co.	229
Illinois Gear & Machine Co.	201
Ingersoll-Rand Co.	263
I-T-E Circuit Breaker Co., Transformer & Rectifier Div.	311
Jacobs Mfg. Co.	218
Johansson, C. E., Div. of Swedish Gage Company	318
Johnson & Bassett, Inc.	96
Jones & Lamson Machine Co.	54-55
Jones & Laughlin Steel Corp.	82-83
Kaufman Mfg. Co.	336
Kearney & Trecker Corp.	20-21
Knight Machinery Co., W. B.	347
L & J Press Corp.	355
Lamina Dies & Tools, Inc.	294
Laminated Shim Co., Inc.	220
Landis Machine Co.	10-11

INDEX TO ADVERTISERS

	Page
Landis Tool Company	12-13
La Salle Steel Co.	269
Lehigh Foundries, Inc.	328
Leland-Gifford Company	95
Lincoln Electric Co.	206-207
Linde Air Products Div. Union Carbide Corp.	219, 319
Link-Belt Co.	27
Linley Brothers Co.	351
Lipe-Rollway Corp.	244
Lodge & Shipley Co.	43
Logan Engineering Co., Lathe Div.	309
Ludwigsburger, Maschinenbau	273
Luers, J. Milton	324
Lufkin Rule Co.	238
Mahon Company, R. C.	257
Mallory & Company, Inc., P. R.	63
Massachusetts Gear & Tool Co.	260
M. B. I. Export & Import Ltd.	302, 327
McCrosky Tool Corp.	246
McGill Mfg. Co.	310
McGraw Hill Book Co., Inc.	326
Meehanite Metal Corp.	76-77
Metal Carbides Corp.	298
Metronic Institute	336
Micro-Chuck Div., Scott Browne Corp.	336
Micromatic Hone Corp.	104
Micro Switch Div. Minneapolis-Honeywell Regulator Co.	317
Minnesota Mining & Mfg. Co.	303
Mitts & Merrill	280
Monarch Machine Tool Company	44-45
Morse Twist Drill & Machine Co.	24-25
Motch & Merryweather Machinery Co.	106
National Acme Company	59
National Broach & Machine Co.	166
National Machine Tool Co.	254
National Malleable & Steel Castings Co.	214
National Tool Co.	51
National Twist Drill & Tool Co.	41
Nebel Machine Tool Company	331
New Departure Div., General Motors Corp.	323
Niagara Machine & Tool Works	66-67
Nichols-Morris Corp.	337
Nilson Machine Co., A. H.	326
North Brothers Mfg. Co.	272
Norton Co.	18-19, 30
O.K. Tool Co.	313
Oakite Products, Inc.	268
Ohio Crankshaft Co.	255
Oliver Instrument Co.	94
O'Neil-Irwin Mfg. Co.	204
Osborn Mfg. Co.	189
Parker-Kalon Division, General American Transportation Corp.	74-75
Parker Stamp Works, Inc.	222
Philadelphia Gear Works	292

(Continued on page 354)

HEX dressers

give you six sets of bearings

Hard use—Desmond Hex Dressers are built for it. Six holes in hardened bearing blocks extend the usefulness of Desmond Hex dressers as many times. As bearing holes wear, turn the blocks for a new set of holes. Blocks readily replaceable when all six sets of bearing holes are worn. Five sizes for all needs. Ask your Desmond distributor for technical advice on proper dressing to make your grinding wheels last longer. The Desmond-Stephan Mfg. Co., Urbana, O.

THE ONLY COMPLETE LINE OF GRINDING **WHEEL DRESSERS AND CUTTERS**

Desmond

THE DESMOND-STEPHAN MFG. CO., URBANA, OHIO

HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE

Write for Circular!

THE SHORE INSTRUMENT & MANUFACTURING CO., INC.

9035 VAN WYCK AVENUE
JAMAICA, NEW YORK

TELEPHONE: JAMAICA 6-4090

MILLING *and* CENTERING *simultaneously and in continuous production*

Now these two entirely different operations can be combined on one machine. The Davis and Thompson continuous type Roto-Matic both mills and centers on both ends in one operation. Rough and finish milling cuts on the ends of the shaft and centering of both ends is completed with only one rotation of the fixture drum. The centering heads travel with the work station until centering operation is complete then drop back to next work station and repeat. Automatic equalizing clamping is provided to the fixture. Spindles have micrometric adjustment and spindle carriers are adjustable on the ways to accommodate shafts of various lengths.

FREE DATA on this and other Davis and Thompson machines is available in our bulletin No. 1000.

Roto-Matic

Davis and Thompson Co.

4460 N. 124th ST. MILWAUKEE 16, WISCONSIN

From the *American Machinist* Library of *Tips for Top Shop Men*

BE sure you are modernizing a *job*, not just a machine. A new piece of equipment never gets a fair chance if units ahead and after it are still ancient klonkers and if feeding and work handling devices are inadequate.

INDEX TO ADVERTISERS

(Continued from page 353)

	Page
Pines Engineering Co., Inc.	325
Pittsburgh Gear Co.	265
Pope Machinery Corp.	286
Portage Machine Co.	333
Potter & Johnston Co., Sub Pratt & Whitney Div. Niles-Bement Pond Co.	53
Pratt & Whitney Div. Niles-Bement Pond Co.	108-109, 212-213
Process Gear Co.	324
Production Specialties, Inc.	288
Railway Express Agency	249
Ready Tool Co.	280
Reich, Mfg. Co., J. R.	334
Revere Copper & Brass, Inc.	195
Rivett Lathe & Grinder Inc.	80
Rockford Machine Tool Co.	89
Rodgers Hydraulic Inc.	215
Ruthman Machinery Co.	260
Ryerson & Sons Inc., Joseph T.	110
S. P. Manufacturing Corp.	208
Scherr Co., Inc., George	338
Schrader's Son, A.	275
Seneca Falls Machine Co.	305
Sheffield Corp.	86
Sheldon Machine Co.	239
Shore Instrument & Mfg. Co., Inc.	353
Sidney Machine Tool Co.	191
Sigourney Tool Co.	296
Simonds Abrasive Co.	209
Simonds Saw & Steel Co.	295
Sinclair Refining Co.	259
Snow Mfg. Co.	281
Socony Vacuum Oil Co., Inc.	197
Sonnet Tool & Mfg. Co.	321
South Bend Lathe Works	203
Springfield Machine Tool Co.	36-37
Stahl Gear & Machine Co.	324
Standard Oil Co. (Indiana)	98-99
Steelweld Machinery Division, Cleveland Crane & Engineering Co.	114
Stewart-Warner Corp.	243
Struthers-Wells Corp.	287
Sundstrand Machine Tool Co.	60-61
Sundstrand Magnetic Products Co.	351
Sun Oil Co.	170
Super Tool Company	289
Supreme Products, Inc.	224
Swartz Tool Pdts. of Detroit, Michigan	232
Taft-Peirce Mfg. Co.	48
Thompson Grinder Co.	241
Timken Roller Bearing Co.	4th Cover
Toolset-Div. General Riveters Inc.	286
Union Carbide & Carbon Corp.	219, 274, 319
Union Twist Drill Co.	49
U. S. Hoffman Machinery Co.	339
U. S. Tool Co., Inc.	31
Universal Engineering Corp.	216

INDEX TO ADVERTISERS

	Page
V & O Press Co. Div. Emhart Mfg. Co.	278
Vaill Engineering Co.	332
Valenite Metals Corp.	264
Van Keuren Co.	16
Van Norman Co.	8-9
Vickers Inc.	78
Victor Saw Works, Inc.	332
Vlier Engineering Inc.	168
Waldes Koh-I-Noor Inc.	193
Walker Co., Inc., O. S.	349
Waltham Machine Works Inc.	286
Warner & Swasey Company	22-23
Webber Gage Company	245
Wells Mfg. Co.	250
Wheelock Lovejoy & Co., Inc.	266
Whitman & Barnes Inc.	248
Willey's Carbide Tool Co.	252
Wilson Air Collect Closer Inc.	276
Winter Brothers Company	40
Woodruff & Stokes	234
Wysong & Miles Co.	299
Yoder Company	288

SEARCHLIGHT SECTION
(Classified Advertising)
H. E. Hilty, Mgr.

EMPLOYMENT
- Positions Vacant 341
- Employment Services 341

SPECIAL SERVICES
- Contract Work 341
- General Pattern Works 341

EDUCATIONAL
- Books 341

BUSINESS OPPORTUNITIES
- Offered 341

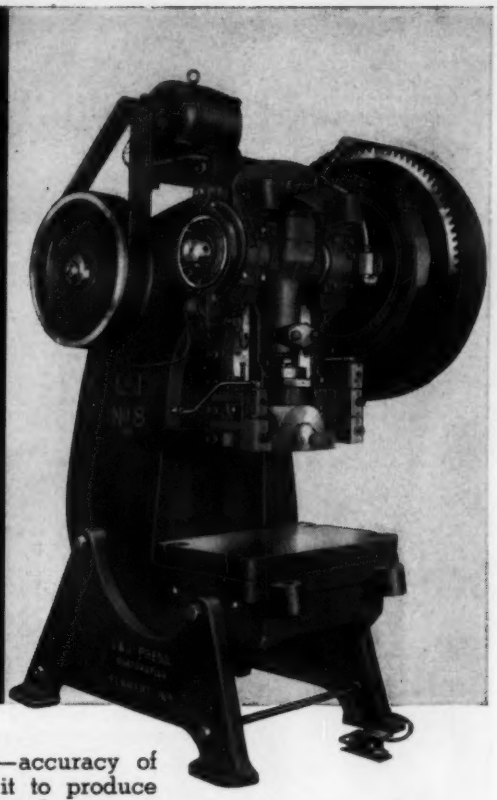
EQUIPMENT
(Used or Surplus New)
- For Rent 344
- For Sale 342-346

ADVERTISERS INDEX

- Aaron Machinery Co., Inc. 345
- Bennett Machinery Co. 346
- Brownell Machine Tool, Inc., Hazard .. 343
- Century Electric Co. 345
- Dony Machinery Co. 346
- Eastern Machinery Co., Inc. 345
- Edwards & Assoc., Ray 341
- Electric Equipment Co. 345
- Emerman Machinery Corp. 346
- Ernest, Holdeman & Collett Inc. 344
- Falk Mill Supply Co., Inc. 342
- Hill-Clarke Machinery Co. 342
- Hyman & Sons, Jos. 346
- Indianapolis Machinery & Supply Co. .. 346
- Industrial Renting Corp. 344
- Machine Tool Publications 341
- Miles Machinery Co. 344
- Morey Machinery Co., Inc. 343
- National Machinery Exchange 344
- O'Connell Machinery Co. 342
- Peacock Corp. 341
- Radax Manufacturing Co., Inc. 346
- Saime Enterprises 346
- Schneir & Co., Inc., Julius J. 341
- Triplex Machine Tool Corp. 343
- Wigglesworth Industrial Corp. 346
- Williams, E. H. 342

NEW L&J NO. 8 PRESS

FOR MORE PRODUCTION AT LOWER COSTS



The rigidity—versatility—accuracy of this new press enable it to produce more at lower costs. It provides a new concept of efficient press operation.

The air clutch is standard equipment on both geared and non-geared models. This provides easier and safer means for maximum practical speeds with shock-free, full-power operation. Alloy iron frame, long adjustable gibs, recessed crankshaft bearing caps, large air release—spring set brake and rugged ram adjusting screw with buttress thread and replaceable bronze seat are but a few of the features that will help to better your press operations.

Specifications

Capacity—90 tons. *Standard Stroke*—4". *Maximum Stroke* (to order)—8". *Strokes* per minute—40 (non-geared type 70). *Throat Depth* center of ram to frame—12½". *Die Space*—16½" to 24" (bed to ram, stroke down, adjustment up). *Bolster Plate Area*—38" x 24".

Write for Catalog—Fully describes all L&J O.B.I. Presses—21 geared and non-geared models. Capacities 8 to 90 tons. Also, 20 to 50 ton High Speed, Double Crank Straight Side Presses with speeds up to 450 s.p.m. Ask for Catalog L-12.

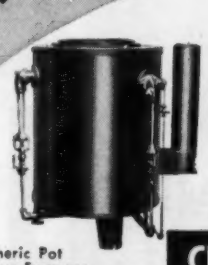
L & J Press Corporation, 1629 Sterling Ave., Elkhart, Ind.

BUZZER
Reg. U. S. Pat. Off.

INDUSTRIAL *GAS* EQUIPMENT

NO BLOWER OR OTHER POWER NEEDED

JUST CONNECT TO GAS SUPPLY



BUZZER Equipment, a buy-word since 1911, provides the hottest and quickest heating . . . without blower or power. Wide range of turn down and heat control. You can depend on a BUZZER.

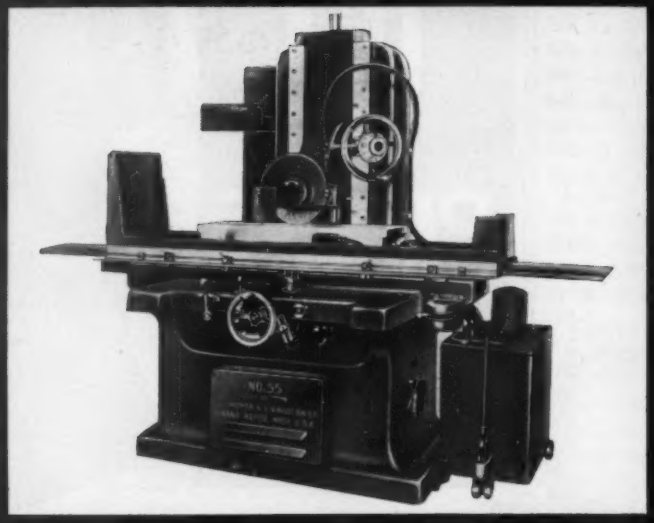
Send for complete BUZZER Catalog

Atmospheric Pot Hardening Furnaces

Mfrs. since 1911

CHARLES A. HONES, Inc.
126 SO. GRAND AVE., BALDWIN, L. I., N. Y.
BURNERS · FURNACES (Heat Treating, Melting, Soldering)

When the need is for SPEED—and PRECISION



You need a

GRAND RAPIDS GRINDER

You get so much more for your money

Every feature of each Grand Rapids Hydraulic Feed Surface Grinder is designed for extra value, extra accuracy, extra high-speed performance.

You get a one-piece column and base. A single massive casting for vibrationless rigidity and permanent alignment between cross travel ways and upright head ways.

You get hydraulic operation of both longitudinal table travel and cross feed. On the larger machine the wheel head is powered for rapid vertical travel to save even more time. ***The model 55 has longitudinal table speed of 125 fpm.!***

All parts are machined to micrometric tolerances and precision assembled to give you perfect freedom of action and entire elimination of play.

That's why 6 out of every 10 Grand Rapids Hydraulic Feed Surface Grinders are sold to customers already using Gallmeyer and Livingston grinding machinery. We will be pleased to quote on your needs.

GET THE FULL STORY ON ALL ADVANTAGES

Ask for Grand Rapids Surface Grinders catalog and get full details on all models and accessories. Catalog of Grand Rapids Universal Cutter and Tool Grinders also available on request. No obligation, mail coupon today to:

GALLMEYER & LIVINGSTON

GALLMEYER & LIVINGSTON

GALLMEYER & LIVINGSTON CO.
430 Straight Ave., Grand Rapids, Mich.

Please send me the following literature without obligation:

- ☐ Grand Rapids Surface Grinder Catalog
- ☐ Grand Rapids Universal Cutter and Tool Grinder Catalog

NAME:_____

POSITION:_____

FIRM:_____

FIRM ADDRESS:_____

All inquiries will be answered within 24 hours

CALL YOUR HOLO-KROME DISTRIBUTOR FOR

SAME DAY SERVICE

ON AMERICA'S TOP-QUALITY SOCKET SCREWS

Any Holo-Krome distributor in the nation can give you a brand of service never before enjoyed by users of socket screw products . . .

Because Holo-Krome ships all standard catalog items right from stock the same day the order is received!

What about Specials? We're proud to say that even the "impossible" ones are leaving the H-K plant in 4 weeks or better — mostly better!

Every day, more and more people specify Holo-Krome — because the price is right, the delivery's right and the quality's always Best!

We guarantee it! Next time, just say . . . HOLO-KROME!

HOLO-KROME
Completely Cold Forged
SOCKET SCREWS

THE HOLO-KROME SCREW CORP. • HARTFORD 10, CONN., U. S. A.

Trepans and bores 32-foot gun barrels—TIMKEN® bearings keep huge spindle accurate

THIS Baldwin-Lima-Hamilton NILES A36B boring lathe has a finished weight of 235,680 lbs. and an overall length of 90 feet. It took one year to build and was specifically made to trepan and bore gun barrels as long as 32 feet. To give its huge spindle high accuracy and stability—despite heavy radial and thrust loads and speeds up to 1000 R.P.M.—the spindle was mounted on Timken® tapered roller bearings.

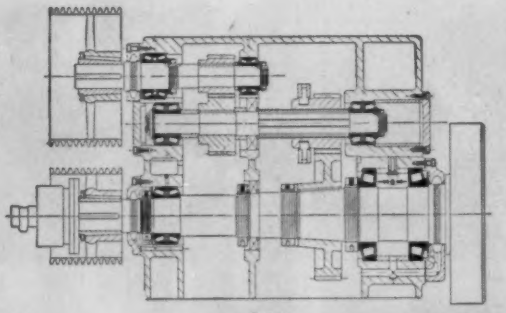
Timken bearings are tapered in construction to take the heavy radial *and* thrust loads this huge spindle gets. Full line contact between rollers and races provides maximum capacity. They maintain spindle precision and accurate gear mesh.

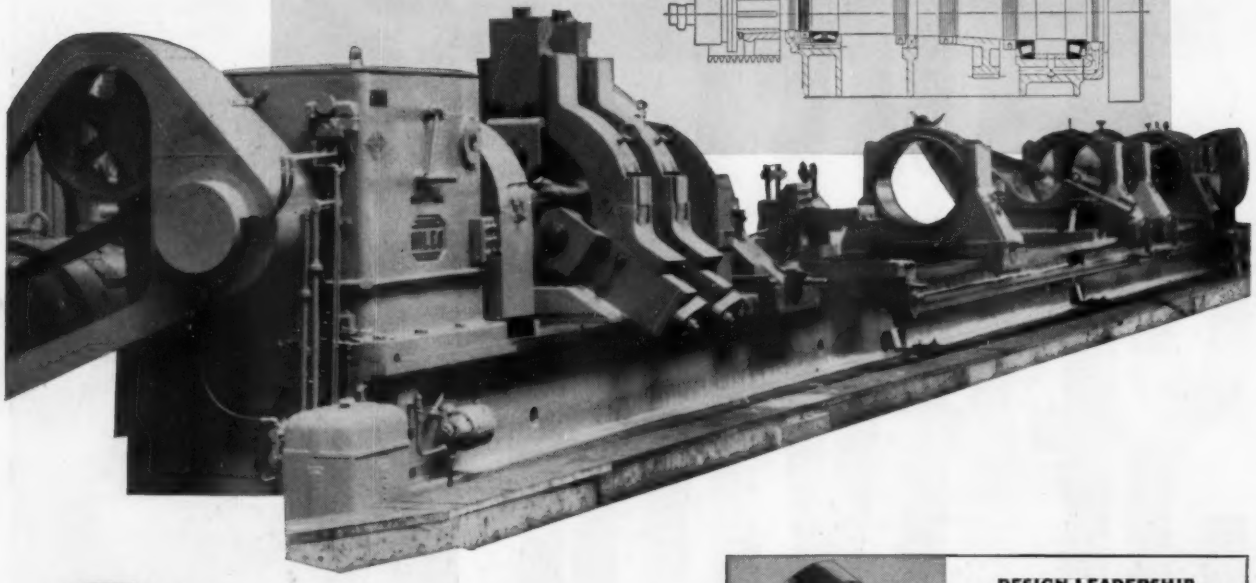
Timken bearings reduce wear because they practically eliminate friction. That's because they're designed by geometrical law to have true rolling motion and made with extreme accuracy so they live up to their design. And they're made of steel we make ourselves: we're the only U. S. bearing maker who takes this extra quality precaution.

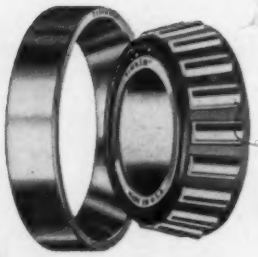
Specify Timken bearings for the machinery you build or buy. Always look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

How **BALDWIN-LIMA-HAMILTON CORPORATION** mounts the spindle of its high-speed NILES boring lathe model A36B on Timken tapered roller bearings to insure less friction, longer life, minimum maintenance.



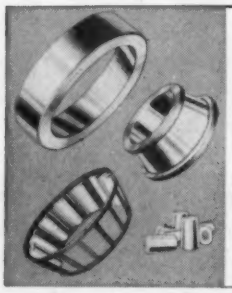




TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



DESIGN LEADERSHIP

The first Timken tapered roller bearing was produced in 1898. Since then the one-piece multiple perforated cage, wide area contact between roller ends and ribs, and every other important tapered roller bearing improvement have been introduced by The Timken Roller Bearing Company.

The Timken Company leads in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels.

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⓪ AND THRUST →⓪← LOADS OR ANY COMBINATION →✳←